INTER-URBAN CRIME PATTERNS IN BRITISH COLUMBIA: AN ECOLOGICAL ANALYSIS

by

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ABSTRACT

The ecology-of-crime approach has been a major source of information in criminology and an important contributor to the search for explanations of crime and delinquency. Although ecological studies have proliferated in the United States, very few such studies have been carried out in Canada. Furthermore, those few studies have been concerned with either regional differences or intra-city differences in the distribution of crime.

This thesis examines the distribution of crime rates among 56 incorporated municipalities in the Province of British Columbia and analyzes the relationships between these crime rate distributions and the differential distribution of other demographic, social, and economic characteristics.

The methodology employed, including the selection of variables for analysis, the multivariate statistical techniques used, and the interpretation of findings, has been grounded in a thorough analysis of previous research. The multi-staged analysis consists of (1) the calculation of zero-order correlation coefficients between crime rates and socio-demographic variables; (2) a factor analysis of crime categories; (3) a factor analysis of socio-demographic variables; (4) a regression analysis of crime rates using socio-demographic factor scores as independent variables; and

(5) a regression analysis of crime rates with selected, single socio-demographic characteristics as independent variables.

The findings are, in a number of respects, similar to those of previous research efforts, but there are some notable differences. Unlike most of the American research, the crime categories used in this study do not factor neatly into two distinct types -- property crimes and personal crimes. Population size and density are significantly related only to rates of robbery, sex offences, and residential breaking and entering, but most significantly to robbery. The regression models indicate that robbery rates are higher in the larger 'urban' centres, whereas assaults occur with greater frequency in the smaller communities. Two general conclusions of this study are that generalizations made regarding large cities do not necessarily hold for smaller communities, and that findings for U.S. cities may not be supported by findings for Canadian cities.

DEDICATION

To the memory of my father.

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It is not possible to complete a project such as this without the assistance of a number of people. I am indebted to my senior supervisor, Dr. Patricia Brantingham, for the support and guidance afforded me during the research phase, as well as in the preparation of the thesis. I wish also to acknowledge the assistance given by the other member of my thesis committee, Dr. Paul Brantingham.

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I. Introduction

The ecological approach to the study of crime has a relatively long history when compared to other criminological perspectives. The nineteenth century witnessed considerable activity, both in England and in continental Europe, in the area of research now referred to as the ecology of crime. In fact, the ecological studies of the last century are now widely regarded as marking the beginning of scientific criminology, pre-dating the work of Lombroso and the Italian positivists.[1]

In terms of impact, it can be said that the ecological studies of crime and delinquency carried out by the Chicago school of sociology in the first half of the present century have been a major source of information and have had a most profound influence upon criminological theory and research.[2]

The Concept of Ecology

The concept of ecology developed originally in the science of biology, not in the social sciences. Charles Darwin who initially outlined the concept,[3] though he did not use the term ecology, in essence, described its ambit as

> (1) the web of life in which organisms are adjusted or are seeking adjustment to one another, (2) the adjustment process as a struggle for existence, and (3) the environment comprising a highly complex set of conditions of adjustment (Hawley, 1950:5-6).

The term human ecology was first introduced in 1921 by Robert E. Park and Ernest W. Burgess of the University of Chicago,[4] and has been defined as follows:

> Human or social ecology is concerned with the relationships which exist between people who share a common habitat or local territory and which are distinctly related to the character of the territory itself; it is a study of social structure in relation to the local environment (Morris, 1957:1).

The concepts and language of human ecology were borrowed directly from plant and animal ecology. Park used the concepts of competition, dominance, succession, symbiosis, and natural areas as integral parts of his organic model of society. Burgess developed a concentric zone hypothesis to explain the processes of urban growth, metabolism, and mobility. The concept of natural areas and the zonal hypothesis have been used repeatedly in the study of urban crime and delinquency.

Natural areas are the product of the processes of urban growth; they are unplanned areas of the city, enclosing similar populations, which result naturally from its growth and expansion. Burgess' concentric zones are employed to illustrate the radial expansion of any city outward from its central business district, each zone exhibiting its own peculiar structural and cultural characteristics.[5]

Early Studies

Present studies in the ecology of crime stem from the tradition of the Chicago school of sociological inquiry, of which Park and Burgess were pioneers. But modern ecological studies of crime and delinquency also have intellectual roots in a number of studies which were carried out in Europe in the first half of the nineteenth century.

The "social physics" of A. Quetelet (1796-1874) and the "moral statistics" of A.M. Guerry (1802-1866) represent the first ventures into the ecological study of crime.[6] Quetelet in Belgium and Guerry in France independently analyzed official crime statistics which began to be published in France in 1825, and both men were struck by the regularities they found in these annual statistics.[7] Quetelet was primarily interested in the effects of such factors as age, sex, climate and other "natural causes" upon the aggregate results, while Guerry was more concerned with small geographical units and "the variation in crime rates from one point to the next and from one district to the other in terms of an analysis of general social conditions and of differences in legislation" (Lindesmith and Levin, 1937:657). Guerry is believed to have been the first to use the cartographic method to present statistical material, or ecological mapping, as it is now called.

In England, the ecological approach was carried on by such writers as Henry Mayhew (1812-1887) and Joseph Fletcher

(1813-1852). Mayhew's The Criminal Prisons of London includes statistical tables which cover the counties of England and Wales and which compare cities and other territorial divisions, although the author was concerned primarily with London and an ecological description of that city's crime (Mayhew & Binny, 1862). Volume four of his London Labour and the London Poor contains a detailed description of London's crime as well as maps and tables showing the distribution of such factors as population density, the number of females, the number of early marriages, and committals for various criminal offences (Mayhew, 1862).

Fletcher, in his Summary of Moral Statistics employs ecological mapping to show the distribution of crime by counties and districts in England and Wales as they relate to such "indices of moral influences" as distribution of the population, real property in proportion to the population, ignorance, early marriages, bastardy, pauperism, and deposits in savings banks in proportion to the population (Fletcher, 1850).[8]

The Ecology of Crime

It is not meant to suggest here that there is complete equivalence between the nineteenth century studies and those of the present century with their much more accurate data and sophisticated statistical techniques, only that the works of writers such as Guerry, Quetelet, Mayhew and Fletcher were

important precursors to the ecological study of crime. Nevertheless, as Morris (1957:42) states, the points of similarity between the early ecologists and the later Chicago school are clear:

1. A primary interest in crime as a social or collective phenomenon of which individual behaviour is a component, rather than in the motivation of crime in the individual.
2. The quantification of data relating to crime and criminals to illustrate qualitative variations in both time and place.
3. The role of objective socio-economic factors such as poverty, education, density of population and external value systems, in determining and perpetuating criminal behaviour.

Ecological criminology is concerned with the spatial distribution of crime rates and the analysis of the relationships between these distributions and the distributions of other socio-demographic characteristics. The unit of analysis in such studies, or the level of aggregation, may be census tracts, districts of cities, cities, metropolitan areas, regions of states, or states. Most of the studies analyze crime data based on "offences known to the police", but there are those that use "arrest" data or juvenile court cases.

There are four basic differential distributions that are of concern to researchers in the ecology of crime (Wilks, 1967):

1. Urban - Rural differences. Empirical research has consistently shown that crime rates are higher in urban

areas than they are in rural areas, the degree to which they vary depending upon the locale and the type of offence.

2. Regional differences. Crime rates vary from region to region within a particular territory.
3. Intra - Urban differences. Crime is not evenly distributed throughout a city or metropolitan area. Overall rates and rates for certain offences are higher in some areas than they are in other areas within the city.
4. Inter - Urban differences. Crime patterns vary from city to city, as they do among areas within a city.

Thesis

The present study examines inter-urban differences in the distribution of crime in the Province of British Columbia. The thesis of the study is that crime patterns vary from municipality to municipality in the province in relation to the varying distributions of other demographic, social, and economic characteristics. Existing ecological research at the inter-urban level suggests that the rates of crime for a number of offence categories vary with the variations amongst cities in such attributes as population size and density, population growth and mobility, age and sex structure, ethnic composition, family structure and stability, housing characteristics, economic characteristics, and the functional specialization of the city.

Organization of the Thesis

This chapter has attempted to provide the briefest of introductions to that area of criminological research known as the ecology of crime and its historical development from the early part of the nineteenth century. Following this introductory chapter is a review of the relevant literature.

Chapter 2 examines a selection of important intra-urban research studies. Such studies constitute the bulk of the research in the ecology of crime -- locating, describing, and analyzing concentrations of crime and delinquency in the areas within cities or metropolitan areas. Although the present study is concerned with inter-urban differences, and not intra-urban, the conceptual link between the two makes at least a partial review of intra-urban studies necessary.

Chapter 3 reviews the literature which focuses upon inter-urban crime patterns. The volume and type of crime varies from city to city, as it does from area to area within cities, and many of the variables used in inter-urban studies are selected because of their apparent significance in intra-urban research.

Chapter 4 provides a general orientation for the present study, discussing what is of interest, hypotheses to be tested, the variables looked at, and data sources.

The analysis of the data is contained in Chapter 5. This chapter discusses the statistical techniques employed in

analyzing the data, the relationships uncovered, and a discussion of the results.

Chapter 6, the conclusion, sums up the findings and discusses the possibilities for future research in the ecology of crime.

Notes

1. See Lindesmith & Levin (1937); Morris (1957); and Radzinowicz (1966).

2. See Wilks (1967) and Morris (1957).

3. Especially in The Origin of Species (1859) and The Descent of Man (1871). It is somewhat ironic that the ecology of crime can be traced to Darwin considering the enormous influence his work had on Lombroso whose positivistic school led to the eclipse of the ecological studies of the nineteenth century. See Lindesmith & Levin (1937); and Voss & Petersen (1971):8.

4. Park & Burgess (1969). See Hawley (1950):8.

5. See Burgess (1925) and Park (1936).

6. For discussions of the work of Guerry and Quetelet see Elmer (1933); Lindesmith & Levin (1937); and Morris (1957):41-53.

7. These were judicial statistics, not police statistics.

8. For discussions of the contributions of early English ecologists see Levin & Lindesmith (1937); and Morris (1957): 53-64.

II. Intra-Urban Studies

Although an exhaustive review of intra-urban research is well beyond the scope of this thesis, it is necessary to examine a number of important studies which focus on the differential distribution of crime and delinquency within urban areas in order to show the direction of such research and the conceptual link with inter-urban studies. Most of the literature in the ecology of crime is concerned with crime patterns within cities or metropolitan areas, and the vast majority of studies have been carried out in the United States. Despite the fact that there have been studies done in other parts of the world, notably the United Kingdom and continental Europe, we will confine our review to those studies conducted in the United States and Canada.

One of the earliest ecological studies of juvenile delinquency was conducted by Burgess (1916) in a small mid-western American city. His data consisted of the records of all children brought before the Juvenile Court over a two-year period, 1912 to 1914. Delinquency rates were calculated on the basis of the juvenile population, ages five through sixteen years, in each of the six wards of the city.

The majority of Burgess' delinquents were at least eleven years old, most were males, and there was a higher proportion of

Blacks among them, both boys and girls. However, Burgess did not find that race was a causal factor; a "low grade home environment" was tagged as the fundamental cause of delinquency.

Burgess noted such conditions as bad housing, poverty, and undernourishment of children in the high rate areas, that only one-eighth of the children in the high rate areas had been vaccinated, and that the ward with the highest rate of delinquency had no church, no school, and no playground. He noted also the "semi-rural character" of the low delinquency areas and the difference in proximity to the business street between the high and low rate wards. In the ward with the highest rate of delinquency "[t]he business street which forms its western boundary has a distracting and quite demoralizing influence upon the children" (Burgess, 1916:726). It was clear to Burgess that the combined influences of the home, the neighborhood, and the geographic environment play a decisive role in the development of the child.

In any discussion of intra-urban variations in crime and delinquency the work of C.R. Shaw and H.D. McKay is of central importance, since subsequent studies have drawn heavily on their research and have generally supported their findings.

> The original Shaw and McKay studies have served as the point of departure for most of the ecological studies which have attempted to explicate the differential distribution of crime and delinquency within urban areas. Many of these studies have aimed at the confirmation of Shaw and MacKay's findings, many have attempted to add new dimensions, and others have been

> concerned with correcting or improving the methodological techniques utilized by Shaw and McKay (Wilks, 1967:144).

During the 1920s and 1930s Shaw and McKay conducted the most extensive ecological studies of delinquency, primarily in the city of Chicago, using as their theoretical framework the model which had been developed by Park, and Burgess.[1] The authors made the observation that certain areas of a city produce a disproportionate number of delinquents, and felt that "the best basis for an understanding of the development of differences among urban areas may be gained through study of the processes of city growth" (Shaw and McKay, 1969:17-18).

Neither the approach used, nor many of the observations made, by Shaw and McKay were new, but they had at their disposal more accurate data and more sophisticated statistical techniques with which to analyze their data. They examined delinquency rates in Chicago by geographic distribution (place of residence) "and the extent to which this pattern has changed or remained constant during a period of forty years" (Shaw and McKay, 1969:43).

They used square-mile areas, as well as zones drawn at two-mile intervals from the city centre, for their comparisons of delinquency rates. The total male population of an area, or zone, aged ten to sixteen years was used as the rate base. These same areas were examined as to the distribution of other social problems, and it was found that "delinquency is not an isolated

phenomenon".

> Instead, it is found to be clearly associated, area by area, with rates of truancy, adult crime, infant mortality, tuberculosis, and mental disorders, as representative community problems (Shaw and McKay, 1969:106).

Delinquency rates were also found to vary with other community characteristics, such as the physical status of the area (i.e., industrial and commercial development, distribution of condemned buildings, and percent population increase or decrease), the economic status of the area (i.e., percent families on relief, median rent, and home ownership), and the population composition (i.e., percent foreign-born, and Negro heads of families).

The use of maps to indicate the distribution of crime and delinquency has been popular in ecological studies since the days of the cartographic school. Shaw and McKay produced four types of maps which are similar to maps now used in most intra-urban studies: dot maps which show the actual geographic distribution of offenders; rate maps showing the variation in rates among square-mile areas; radial maps, showing variation in rates, or gradients, drawn from the city centre; and zonal maps which show the averages of the rates in the square-mile areas within the concentric zones (Morris, 1957:75).

The findings of Shaw and McKay may be summarized as follows:

1. Delinquency rates vary widely in different areas within a

city, town, or metropolitan area.

2. The highest delinquency rates are to be found in the low-rent areas near the centre of the city, the rates decreasing with greater distance from the city centre. This is known as the "gradient hypothesis".
3. High delinquency areas tend to maintain their high rates over time, regardless of the area's changing ethnic composition.
4. Areas with high rates of delinquency also have high rates of truancy and high rates of adult crime. Also, if an area has a high rate of male delinquency, it usually has a high rate of female delinquency.
5. Areas with high delinquency rates are characterized by such things as physical deterioration and a declining population.
6. Delinquents in high rate areas are most likely to become recidivists; among recidivists, they are likely to have many more court appearances than those from areas with low delinquency rates.
7. "In summary, delinquency and crime follow the pattern of the social and physical structure of the city with concentration occurring in disorganized, deteriorated areas" (Wilks, 1967:143).

As an explanation of their findings Shaw and McKay offered the concept of "social disorganization". The high delinquency and crime areas of a city were those which were

> in a process of transition from residence to business and industry and are characterized by physical deterioration, decreasing population, and the disintegration of the conventional neighborbood culture and organization (Shaw, et al, 1929:204).

Social disorganization, or the disintegration of the community as the basis of social control, occurred primarily in those areas at or near the city centre which exhibited the effects of industrialization, poor housing, overcrowding, a low standard of living, and a transient population. These were the areas of the city which experienced waves of new immigrants, in a continuing process of invasion and succession. In these disorganized areas, delinquency becomes traditional, it was argued, by delinquent values and goals being transmitted from one group to another and from one generation to the next. This process would explain, for Shaw and McKay, the very high correlations between the delinquency areas of 1900-1906 and those of 1927-1933.[2]

The work of Shaw and McKay has been criticized on a number of grounds. Robison (1936) felt that the gradient of delinquency rates outward from the city centre was simply coincidental with a particular type of urban development, since it did not hold true for all cities. She questioned delinquency rates based on court appearances as a reliable index of the extent of delinquent behaviour in an area. She argued also that Shaw and McKay did not give adequate consideration to the differences among groups of approximately the same socio-economic status who

lived in similar areas.

Jonassen (1949) questioned the validity of data upon which comparisons were made over a period of three decades. The data, he argued were not uniform. There were differences in the census tracts of 1923-1927 from those of 1900-1906, variations in police policy over the years, and changes in demographic factors, such as the age and sex structure. Jonassen considered the square-mile area used by Shaw and McKay to be too large "for if it embraces several culturally distinct communities, their differential delinquency rates will be masked by the aggregate" (Morris, 1957:89).[3]

Lottier's (1938) study of crime in Detroit generally confirmed the gradient hypothesis. Crime rates did tend to decrease with increased distance from the city centre. However, near the city boundaries the rates seemed to rise slightly, presumably because of the presence of industrial and commercial satellites in the regions of the city's periphery.

Lottier found a gradient distribution for four offences -- murder, aggravated assault, rape, and robbery -- in both the Detroit commutation area and the metropolitan region. Burglary, larceny and auto theft were "not distributed according to a gradient...". Lottier then computed burglary rates based on the number of potential targets (units of property rather than units of population) and found that they comformed to the gradient. He inferred from this "that a gradient would be characteristic also

of the distribution of larceny and auto theft if comparable rates could be calculated for these offences" (Lottier, 1938:49).[4]

One of the most frequently cited ecological studies is Lander's (1954) study of delinquency in Baltimore, primarily because it failed to confirm the findings of Shaw and McKay and numerous others who had focused attention on intra-city crime patterns. Lander's study was one of the first to use multivariate statistical techniques to any great extent. The Baltimore study also provided much of the impetus for subsequent research which attempted to weigh the relative merits of anomie as opposed to socio-economic explanations of crime and delinquency.

Lander used official court records of delinquency for the period 1939-1942 and information from the 1940 census. He derived seven census tract variables in his attempt to predict delinquency rates in Baltimore. First, he obtained the zero-order correlation coefficients between delinquency and his seven variables. He then performed a factor analysis from which he extracted two factors, one labeled "Anomie" and the other "Socio-economic". Next, Lander performed a series of multiple regression analyses on the data.

It is now understood that the Baltimore study is flawed because of errors in Lander's statistical analysis,[5] but because the findings seemed to contradict those of earlier research,

especially the findings of Shaw and McKay, the study has drawn considerable attention. Of his seven variables, only two, percent non-white and percent homes owner-occupied, were independent correlates of the delinquency rate. Despite the statistical significance of the relationship between Negro population concentration and delinquency, Lander did not believe that race per se was directly linked to delinquency; he believed that it was racial heterogeneity which was related to delinquency. He felt racially heterogeneous areas had high rates of delinquency because they were low in social integration and high in anomie.

The more important of Lander's conclusions are as follows:

1. Negro delinquency is a reflection of social instability (i.e.,anomie) and not a function or effect of race per se.
2. Frequency of home ownership is a measure of social stability.
3. Median years schooling and median rent are not fundamentally related to the prediction and/or understanding of juvenile delinquency.
4. There is no general tendency in Baltimore for heavy industry to surround or be located near the central business district.
5. There is no necessary relationship between delinquency and proximity to industry.
6. In Baltimore, there is no significant relationship between

delinquency and the rate of population change in an area.

7. In Baltimore, the relationship between high rates of delinquency and large concentrations of foreign-born is inverse.

Lander believed his results demonstrated that delinquency rates were for the most part related to a condition of anomie, and only superficially to socio-economic status.

> The factor analysis clearly demonstrates that delinquency in Baltimore is fundamentally related to the stability or anomie of an area and is not a function of nor is it basically associated with the economic characteristics of an area. The factor analysis also suggests contrary evidence to the Burgess and Shaw thesis that all the variables correlated with juvenile delinquency, including delinquency, "may be considered manifestations of some general basic factor" (Lander, 1954:58-59).

The "general basic factor" here referred to is, of course, social disorganization.

Bordua (1958-59) attempted to replicate a part of Lander's study and "to clarify the theoretical framework involved". His dependent variable was the "unduplicated tract official court delinquency rate for the period 1948-1952" in the city of Detroit; the independent variables were selected from the 1950 census for that city.

Bordua was able to match Lander's independent variables except for median rent and median estimated value of owner-occupied dwelling units. With no correction for curvilinearity, the results for Baltimore and Detroit are quite

different. Only percent owner-occupied (negative) was found to be significantly related to delinquency in Baltimore; in Detroit, median education (negative), percent overcrowding (positive), percent owner-occupied (negative), and percent foreign-born (negative) were all significantly related to delinquency. With correction for curvilinearity, percent non-white (negative inflection) was significant for Baltimore; percent foreign-born dropped out for Detroit.

Bordua introduced two new variables, median income as an index of economic status, and the ratio of unrelated individuals to the total of families and unrelated individuals as an index of social instability, and obtained four independent predictors of the tract delinquency rate: (1)overcrowding, (2)owner-occupancy, (3)unrelated individuals, and (4)median education, with the best predictor being the owner-occupancy rate.

Bordua performed a factor analysis and extracted three orthogonal factors: (1)a factor describing the "deteriorated areas of high non-white settlement", with the highest loadings on overcrowding, substandard housing, and percent non-white; (2)a socio-economic factor, with high loadings on median education, median rent, and estimated value of housing; (3)a poverty/social disorganization factor, with high loadings on owner-occupancy, substandard housing, unrelated individuals, and median income.

Even though the findings of the Detroit study were not identical to those of the Baltimore study, Bordua's interpretation of these findings was essentially the same as Lander's; that is, anomie was an important predictor or indicator of delinquency.

Chilton (1964) tried to reconcile the contradictory findings of Lander and Bordua by a replication of the Baltimore and Detroit studies using data for Indianapolis, an explanation of the effect of selected additional variables, and a re-analysis of part of the material made available by Lander and Bordua.

Chilton used juvenile court referrals for the period 1948 through 1950 and the 1950 census as data sources. His unit of analysis was the census tract. After obtaining the zero-order correlation coefficients, he ran a regression analysis and a factor analysis on the data, correcting for curvilinearity, and examined the effects of two additional variables, as well as a larger set of variables.

Chilton found that, in general, similar factors were associated with delinquency in the three cities. "The interpretation of owner-occupied, percent non-white and delinquency as indicies of a condition of anomie, however, is not supported" (Chilton:81). Furthermore, the results of Chilton's analysis did not support Lander's interpretation and he questioned the utility of the anomie explanation suggested by

Lander.

> ...we conclude that a number of variables might be interpreted as indicators of anomie but that so classifying these variables does not increase our understanding of delinquency or anomie.... Our findings suggest that delinquency still appears to be related to transiency, poor housing, and economic indices; this supports the assumption of almost all sociological theories of delinquency, that delinquency in urban areas is predominantly a lower-class male phenomenon (Chilton, 1964:82-83).

Despite the difference in findings among the studies of Chilton, Lander and Bordua and the "differences in population size, physical layout, geographical location, demographic composition, and historical tradition" among the three cities of Baltimore, Detroit and Indianapolis, Chilton noted that "the congruity of the findings is remarkable" (Chilton:83).

Schmid (1960) attempted to describe and analyze the spatial distribution of crime in Seattle using twenty "relatively specific and precise categories" of crime and eighteen "significant social, demographic, and ecological attributes" (Schmid, 1960a:527).

Schmid analyzed two series of crime indices, the first (crimes known to the police) covered the three-year period 1949-1951, and the second (arrests) covered the two-year period 1950-1951. The range of "crimes" used by Schmid was somewhat unusual, since it included a number of minor offences not found in other research of this nature: attempted and completed suicide, drunkenness, disorderly conduct (fighting, etc.),

vagrancy, sex offences (lewdness and indecent exposure), larceny (petty larceny, shoplifting, bicycle theft, auto theft, theft from autos), cheque fraud, burglary (residence, day and night, and non-resident, day and night), and robbery (highway and car, and non-residential). His eighteen variables, reflecting the social structure of Seattle, were derived from the 1950 census at the tract level. Schmid first computed three sets of correlation coefficients: the intercorrelations of crime rates, of crime rates and socio-demographic variables, and of the socio-demographic variables. He then subjected his data to a factor analysis and extracted eight factors by orthogonal rotation. The eight were labeled (1)Low Social Cohesion-Low Family Status; (2)Low Social Cohesion-Low Occupational Status; (3)Low Family and Economic Status; (4)Population Mobility; (5)Atypical Crime Pattern; (6)Low Mobility Groups; (7)Ambiguous ("difficult to interpret"); (8)Race. "The first three factors possess the least error and thus may be regarded as the most reliable ones" (1960a:539). Schmid used factor analysis not only to provide a means of reducing a large number of variables to a relatively small number of socio-economic dimensions, but also to provide "a basis for isolating, identifying, and describing crime areas in the large city" (1960a:541-542).

Factor 3, low family and economic status, Schmid considered "the urban crime dimension par excellence", ranking significantly higher than either Factor 1 or Factor 2. Factor 6,

low mobility groups, "is the only factor in which one or more crime varibles are not represented" (1960a:538). Schmid's findings suggested that high crime rates did occur in "skid road areas," and low crime rates in the more stable, middle class areas.

Schmid, unlike most of those who have done ecological research, examined the distribution of crime sites as well as offender residences. Most studies have looked only at where offenders live as a measure of crime or delinquency in an area. Nevertheless, Schmid found that both offence rates and arrest rates tend to decrease with increased distance from the city centre, that "[t]he central segment of the city is not only a locale where large numbers of crimes are committed, but also a section where most of the criminals are domiciled" (Schmid, 1906b:660). These two gradients and the other of Schmid's findings are generally in agreement with those of previous research. "The differences that may be observed are due fundamentally to the greater specificity, detail, and comprehensiveness of the data as well as the more intensive analysis and varied methods utilized in the present study" (1960b:674).

In summary, Schmid found that urban crime areas were generally characterized by:

1. low social cohesion;
2. weak family life;

3. low socio-economic status;

4. physical deterioration;

5. a high rate of population mobility; and

6. personal demoralization (social problems).

The findings of intra-urban research into the ecology of crime up to the end of the 1960's has been summed-up by Wilks (1967:149):

> ...whether concentric zones, individual census tracts, or census tracts grouped into social areas are investigated, the most frequent finding is that offenses and offenders tend to be concentrated in areas characterized by low income, physical deterioration, mixed land usage, nontraditional family patterns (e.g., homes broken in some manner, and/or women employed in the labor force), and racial-ethnic concentrations which appear to produce low neighborhood cohesion and low integration of the neighborhood into the larger society.

Beasley and Antunes (1974) found fault with the method of analysis employed in earlier research. They noted that past ecological studies of crime followed a similar procedure:

> An intercorrelation matrix of demographic variables and crime rates is computed, and orthogonal factor analysis is applied to extract a sufficient number of independent principal components to reconstitute the intercorrelation matrix. After rotation to simple structure, attempts are made to identify the factors, and various interpretations are advanced as to why certain crime variables load on a factor with certain demographic variables (1974:440-441).

Previous research is limited by the use of factor analysis, the authors claimed, because it is not an explanatory device. They suggested that the first step should be to factor the socio-demographic variables independently and then regress the

factor scores on crime rates, so that judgments can be made concerning the impact of such factors on crime rates.

Beasley and Antunes analyzed eight categories of crimes known to the police, and census data for the twenty police districts of Houston, Texas. Crimes were grouped into three larger categories: crimes against the person, crimes against property, and total crimes. Crime rates per 10,000 were based on the total population of each police district. The socio-demographic variables used in the analysis were obtained from the 1970 census.

The authors used three types of parametric statistical techniques to analyze their data. First, they computed the zero-order correlation coefficients for the socio-demographic variables and the three crime categories. Then they conducted a stepwise multiple regression for each crime rate. Finally, a polynomial regression analysis was used to examine the relationship between each crime rate and each independent variable.

What Beasley and Antunes found was that population density was the best predictor of both the total crime rate and crimes against property, and correlated highly with rates of crimes against persons. Median income was the strongest predictor of crimes against persons. Percentage Black and percentage Mexican-Americans were associated with the crime rates, but the multicollinearity with other variables made a racial or ethnic

interpretation difficult. In short, they found high linear correlations between all the crime categories and the socio-demographic variables, and even stronger curvilinear relationships for both personal and property crimes with all the variables.

Mladenka and Hill (1976) believed that the findings of Beasley and Antunes, that different types of crime were "similarly associated with socioeconomic indices," were "anomalous". They attempted a re-analysis of the ecological determinants of Houston crime rates. They used restructured police districts and excluded the police district located in the central business district because of its extremely high crime rates. Their crime variables were identical to those used by Beasley and Antunes, except that they used 1973 rates (instead of 1970 rates) for the restructured police districts. The independent variables were eight socio-demographic indicators derived from 1970 census information.

Unlike the findings of Beasley and Antunes, Mladenka and Hill found "distinctive relationships for property and personal crime." They found some nonlinear relationships with certain of the personal crimes; however, "[t]he best fitting model for property crimes, total crimes, and the remainder of the personal crime regressions is linear. Furthermore, even the linear relationships tend to be weaker for the property and total crime rates" (Mladenka & Hill:498).

To ensure that the differences between their findings and those of Beasley and Antunes were not the result of the differences in the data and the analyses, Mladenka and Hill re-analyzed the 1970 data. The authors found that the re-analysis supported their 1973 analysis "with two exceptions -- personal crimes predicted by density in 1970 and property crimes predicted by income level in 1973".

> Personal crimes are curvilinearly related to the traditional status-income variables and linearly, if at all, related to the remainder. Property crimes are linearly -- but more weakly -- related to all these demographic indicators (Mladenka & Hill:503).

Mladenka and Hill's results showed that personal crimes were highly correlated with poverty, density, and percent Black; poverty and density were found to be "fair predictors" of property crimes, with these crimes more prevalent in areas of the city with "high poverty, low income, and high ethnicity."

The authors contended that their analysis of Houston's crime distribution contradicts Beasley and Antunes and agreed with "the general findings of most previous research that different types of crime associate differently with population characteristics deemed important to the etiology of crime" (Mladenka & Hill:504).

There have not been many ecological studies of crime carried out in Canada. Bell-Rowbotham and Boydell (1972) examined and described "the distribution of crime in Canada as a whole as well as variations by province, urban and rural areas,

and city size". They also "described the characteristics of convicted persons, and noted variations according to the background characteristics of sex, age, marital status, residence, education, and occupation" (Bell-Rowbotham & Boydell:115).

Jarvis (1972) looked at delinquency rates by census tract in London, Ontario. He attempted to test four hypotheses, all garnered from the findings of research done in the United States:

1. High rates of delinquency are concentrated in specific areas of the city, not evenly distributed throughout.
2. Areas with high rates lie near the city centre; delinquency rates decrease with distance from the centre.
3. Delinquency is negatively correlated with all measures of socio-economic status; delinquency rates are high in areas with low socio-economic status.
4. Delinquency is positively correlated with all indicators of "anomie" (Jarvis, 1972:201-203).

Jarvis found that areas of high delinquency

> ...were all located relatively near the centre of the city, but the relationship with distance from the centre was found to be a function of the economic poverty of the areas.... This variable was more significant than any other socio-economic variable; moreover, poverty was more important than any other indicator of anomie in predicting rates of juvenile delinquency...(Jarvis:211).

Jarvis and Messinger (1975) re-examined, more systematically, the findings of Jarvis (1972) using multivariate statistical techniques of analysis and confirmed "the importance of poverty in explaining areal delinquency...." The authors stated flatly that "[t]he power of socio-economic status, especially poverty and old housing,...provides support for a mainly economic explanation of areal delinquency for a Canadian city" (Jarvis & Messinger:191).

Engstad (1975) examined "the volume and pattern of offenses associated with licensed hotels (i.e., hotels with taverns) and shopping centres" in Edmonton. He also devised opportunity-based offence rates. He found that districts with hotels and shopping centres had more offences "deemed relevant to the presence of such facilities... This finding is consistent with earlier studies which have shown specific offenses to cluster in areas rich in opportunity for their commission" (Engstad:206).

Singh, Celinski, and Jayewardene (1980) conducted an ecological study of crime in Ottawa. Their crime variables were rates of crime against persons, sexual offences, property offences (with and without violence), and crimes against public order; the demographic and socio-economic variables used were average rent, proportion of tenant occupied buildings, male and female unemployment rates, number of persons per room, number of children per family, median income, and number of persons per family.

The authors found that the higher the male unemployment rate, the higher the crime rate; there was no significant relationship between crime rates and female unemployment. Consistent with previous research, average cash rent, median income, number of persons per family, and proportion of tenant-occupied dwellings were all found to be negatively related to total crime rates. However, the authors conclude that "attempts to predict crime other than sex offences with the ecological...variables that have been considered here are useless" (Singh,et al, 1980:81).

The research into intra-metropolitan crime patterns is rife with inaccuracies and methodological flaws, some of which have been noted in the literature reviewed above. To delve further into the problems of data and method at this point would take us too far afield. However, methodological issues are discussed regarding inter-metropolitan research at the end of Chapter 3, where it is more directly pertinent to the focus of the present study.[6]

To summarize, the findings of intra-metropolitan research indicate a number of characteristics which seem to be associated with high or low crime rate areas. High crime areas possess attributes such as location in or near areas of industrial or business concentration; location at or near the centre of the city; greater density of potential crime targets (banks, stores, automobiles etc.); greater size and density of population; a

declining population; rapid growth; racial or cultural heterogeneity; transiency, drunkenness, and fighting; high rates of truancy, tuberculosis, mental disorder, and infant mortality; a high proportion of unmarried and unemployed males; poverty; low income; low median rent, low family status, low economic status, and low education; poor and overcrowded housing; and physical deterioration. Low crime areas are characterized by low population growth; low population mobility (i.e., stability); a high proportion of foreign-born whites; a high proportion of owner-occupied dwellings (i.e., home ownership); a high proportion of the population sixty years of age and over; a high proportion of the population employed as proprietors, managers, and officials; racial and cultural homogeneity; single-family dwellings; a high fertility ratio; and a low proportion of women in the labour force.

Notes

1. Actually, Shaw & McKay did not rely much on Park's biotic model, but more on Burgess' zonal model of the city.

2. For discussions of social disorganization see Burgess (1925:53-58); and Taylor, Walton, & Young (1975:123-127).

3. A critique of the works of Shaw & McKay can be found in Morris (1957:85-91).

4. For a discussion of crime specific rates see Boggs (1965).

5. Critiques of Lander's study are provided by Gordon (1967) and by Rosen & Turner (1967).

6. A critical review of intra-urban research aims and methodology is to be found in Baldwin (1979).

III. Inter-Urban Studies

It has been pointed out earlier in this paper that crime rates vary from city to city in a given territory or region. One should expect crime rates to vary from place to place, since changes in such things as age and sex structure, population growth and mobility, housing characteristics, urbanization and wealth are not evenly distributed geographically or socially.

One of the earliest attempts to investigate the differential variation in crime rates among cities was that of Ogburn (1935), who sought to discover "factors that cause some cities to have higher rates than others". Ogburn's crime data came from the Uniform Crime Reports of the F.B.I. for 1930. His analysis utilized the rates for six criminal offence categories, including criminal homicide, rape, robbery, aggravated assault, burglary, and larceny, which were combined into a general crime rate for each of the sixty-two cities looked at. Larcenies and burglaries constituted the largest number of cases, with far fewer robberies; and these offences far outnumbered homicides, rapes and assaults.

Ogburn selected three samples of U.S. cities according to population size: large cities (16), ranging in size from 250,000 to 578,000; medium-sized cities (24) of 100,000 to 168,000; and

small cities (22) with from 36,000 to 58,000 inhabitants. The socio-economic variables used by Ogburn were selected on the basis of previous ecological findings.

In his correlational analysis Ogburn was primarily concerned with "isolating and measuring the influence on crime rates" of single variables, but he did note the emergence of three clusters of variables which, regardless of city size, seemed to have an influence on crime rates. One cluster centered around the immigrant, with percent foreign-born, percent offspring of foreign-born, church membership rates, and percent engaged in manufacturing all interrelated. A second cluster centered around wage rates, rates of growth, and rent levels. The third was a single variable, the sex ratio, "around which there seem to be...few other significantly correlated factors" (Ogburn:33).

Of the twenty-four variables examined by Ogburn, eight or ten seemed to have at least some influence on crime rates; seven accounted for more than fifty percent of the variance in city crime rates. The findings were "inconclusive", but the results did show that the socio-economic variables were differentially related to crime rates of different sized cities. In summary, Ogburn interpreted his findings as follows:

1. The more males (proportionately) a city has, the higher will be its crime rate;
2. The more young and single people in the population, the

higher the crime rate;

3. The more foreign-born and children of immigrants, the lower the crime rate;
4. A large church membership seems to be related to lower crime rates;
5. Cities with more children or larger families have lower crime rates (intercorrelated with foreign-born and church membership);
6. Cities with more manufacturing have lower crime rates (intercorrelated with church membership and immigrants and young children);
7. Cities with increasing wages have lower crime rates; those with declining wages have higher rates;
8. High rents are associated with low crime rates when rent is considered an economic variable;
9. Home ownership does not seem to be related to crime rates;
10. Cities with increasing rates of growth have lower crime rates.

Schuessler (1962) believed that crime-specific rates were of greater use than the general crime rates used by Ogburn, since they reflected "the assumption that crime is not a unitary phenomenon, and that different kinds of crimes have different causes" (Schuessler, 1962:314,fn). Schuessler looked at crime rates in 105 cities in the U.S. in 1950 with populations of 100,000 or more. His aim was "to determine whether the variation

in the crime rates of these large cities could be statistically explained by a small number of general factors, or whether a multiplicity of factors would be required" (Schuessler:314). He also wanted to be able to interpret his results in a sociological context.

Schuessler averaged the number of offences for the years 1949, 1950, and 1951 for the seven major crime categories (crimes known to the police)-- murder, aggravated assault, robbery, burglary, grand larceny, petty larceny, and auto theft. The rates for each city were based on 100,000 population, fifteen years of age and over. The twenty independent variables, indicating socio-economic characteristics, were selected from the 1950 U.S. census, based on criteria which included availability, presumed relevance to the crime rate, use in previous research (i.e., Ogburn), and their purported value as an index of a social factor (such as anomie).

The statistical procedures used by Schuessler were somewhat more sophisticated than Ogburn's. First, he obtained the linear correlations between offence rates and the socio-economic variables. Then he obtained the intercorrelations among the seven offence rates and factored them. Three factors reproduced the correlations: (1)crimes against the person; (2)crimes against property; and (3)a factor which could not be interpreted because all the loadings were statistically weak. Schuessler then factored all twenty-seven variables, seven crime categories

and twenty socio-economic variables, and found that five factors accounted for about sixty percent of the variation in crime rates.

Factor 1, which explained the greatest amount of variance in the data, was identified as the "degree of social frustration" (Merton's anomie). Factor 2 was uninterpretable. Factor 3, which did not seem to be related to crime, was the "degree of institutional control". Factor 4 seemed to mitigate against crime and was called the "degree of industrialization". Factor 5 was uninterpretable.

Schuessler believed that his findings showed (1)that linear correlations, in general, confirm the view that crime is a function of social circumstances, and (2)that a single, composite index of crime is of little value in ecological research; it is better to use specific offences, or offences grouped into broader categories.

Schuessler and Slatin (1964) continued the effort "to determine whether the variation in city crime can be resolved into a relatively small number of statistical components that have a recognizable sociological meaning". The authors conducted a more extensive analysis of Schuessler's earlier research, using eight additional social and economic variables. Intercorrelations among thirty-five variables (including the crime rates) were subjected to factor analysis. Five factors were extracted from the data: Factor 1, Anomie; Factor 2,

Minority; Factor 3, Conformity; Factor 4, Education; and Factor 5, Family.

Schuessler and Slatin found that two of Schuessler's (1962) original interpretations, the anomie factor and the conformity factor remained unchanged. However, in this more extensive study they were able to interpret the major component in property offences as anomie. Offences against persons loaded heavily on the minority factor. They also found that crime rates appeared to be independent of such social processes as education and the family.

In a second part of their study, Schuessler and Slatin analyzed 1960 data as well. Because the number of cities examined in this second series was 133 rather than the 101 used in the 1950 series, it was felt that the 1960 findings would have a higher degree of statistical reliability. However, the latter study was an incomplete and flawed replication of the 1950 series due to a number of differences in the data (Schuessler & Slatin:138).

The combined results of the Schuessler and Slatin studies may be summarized as follows: (1)The statistical distributions, averages, and variances for the 1950 and 1960 series, for both zero-order and partial correlations were similar; (2)the variables tended to cluster in roughly the same rank order for both series; (3)the factorial results for the two series were similar; (4)the seven crime rates had roughly "the same rank

order according to the strength of their relation to the anomie and the minority factors, in both time periods..."; and (5)the anomie and minority factors, taken singly or in combination, were consistently related to crime rates, "but only inconsistently to the external social, economic, and demographic variables which might serve as independent predictors of the crime rate..." (Schuessler & Slatin:145).

The findings of Schuessler and Slatin suggest that offence rates among large U.S. cities cannot be "attributed to a single general factor, such as urbanization, industrialization, or standard of living. Two or three factors accounted for most of the variation in crime rates. The social processes of personal and property crime were different; personal crime appeared to be an aspect of minority relations, property crime an aspect of anomie. The authors claimed that "generalizations about variation between large cities do not necessarily hold for subdivisions within those cities". Although the findings were "generally inconclusive", the authors suggested that, since crime rates were consistently dependent on the anomie and minority factors, this implied that crime rates varied with the degree of differential social disorganization (Schuessler & Slatin:147).

Kyllonen's (1967) study was an attempt to adapt astrophysical equations in order to describe the relationship between reported crime rates and population density. The author

used crime data on murder, rape, robbery, and assault from the Uniform Crime Reports and six size-groupings of cities in his analysis. He found that, rather than a whole "constellation of factors" being responsible for crime in U.S. cities, "the major responsibility rests with a number of simple factors such as population density..." (Kyllonen:145).

The 1968 study by Eberts and Schwirian sought to test the hypothesis "that variations in community crime rates are associated with variations in local structural sources of relative deprivation". The first step in their analysis of 200 U.S. census designated Standard Metropolitan Statistical Areas (SMSAs) was to determine empirically whether or not there was a distinction between crimes against the person and crimes against property. The crime categories they used were the seven major index crimes from the U.C.R. Rates for specific crimes were subjected to factor analysis. The authors found a strong general crime factor and a strong factor including murder and assault, but no crimes against property factor.

Eberts and Schwirian explored two structural sources of relative deprivation: a general social status deprivation and the relative economic prosperity of whites and non-whites. As a measure of general social status deprivation they used "the ratio of the number of persons in the community earning $10,000 or more per year to those earning $3,000 or less a year" in 1961. The measurement of the occupational gap between whites and

non-whites involved "the percentage of each in white collar occupations". Three control variables were used in the analysis: the percentage of the SMSA population which was non-white, the total population size of the SMSA, and the regional location of the SMSA.

The authors expected to find that SMSAs with a large upper class would have higher crime rates than those with a more balanced class structure, and that SMSAs with a balanced class structure would have higher crime rates than those with a large lower class. In addition, they thought "that as the status gap between whites and non-whites widens that non-whites experience greater relative status deprivation which leads to higher rates of local crime" (Eberts & Schwirian:47). According to the authors, the results of the research bore out their expectations and the relative deprivation hypothesis was supported.

Pressman and Carol (1971) were interested in determining if the frequency of certain crimes was a function of urbanization. Their crime rates for ninety-five SMSAs were obtained from the Statistical Abstract of the United States (Department of Commerce and Justice). Correlations were sought between crime rates and population density and net in-migration rates.

The authors found (1)no relationship between educational levels and crime. (2)The correlations between the number of police per capita and crime rates were positive and significant. (3)The correlations between the mean annual temperature and

crime (especially crimes against the person) were positive and significant, but the partial correlation between these variables, holding the racial factor constant, was not significant. (4)There was no relationship between crime rates and population density. (5)There was a high positive correlation between the racial factor and crime rates. (6)The correlations between net migration and property crimes (except for auto theft) were positive and significant. Pressman and Carol concluded from this that "the process of urbanization [as measured by net in-migration rates] does appear to be directly related to crime rates" (Pressman & Carol:234).

The study by Normandeau and Schwartz (1971) was somewhat different from most inter-urban ecological research. They attempted a crime classification of 164 SMSAs. Using data for the seven major index crimes they obtained a crime profile for each of the SMSAs for the years 1960, 1963, and 1966 (employing the partition of frequency distributions to obtain profile stability). The criteria used in the classification were, by the authors' own admission, arbitrary. "All SMSAs falling above the fifth sextile and below the first were noted", this procedure being repeated for each of the seven crime categories for the three years mentioned. The classification allows one to see how a given SMSA stands relative to all other SMSAs on each major crime, and to see how stable the profile has been in selected past years. The general conclusion of the Normandeau and

Schwartz study was that "contiguous urban areas tend to exhibit similar crime profiles" (Normandeau & Schwartz:238).

Cho (1972) examined two types of public policies, control and service policies, in an effort to find out if they had a significant effect in reducing serious crime and in slowing the upward trends in crime rates in the forty-nine largest U.S. cities. In short, it was "a systematic inquiry into the public policy impact on crime-deterrence in the nation's major cities" (Cho:436). What the author meant by control policies was "policies for law enforcement and criminal justice that directly affect governmental capacity to handle criminal acts and criminals" (i.e., policies related to police, courts, and corrections). Service policies were social service policies "that provide amenities and opportunities essential for the enhancement of the quality of urban life".

Cho's crime data were obtained from the 1965 and 1970 Uniform Crime Reports and included the seven major U.S. crime categories. Crime rate trends (based on 100,000 population) were computed using the 1970 crime rate as a percentage of the 1965 crime rate for each offence category. His model consisted of three components: (1)crime rates and crime rate trends; (2)measures of public policy (twenty-one control policy variables and seven social service policy variables grouped into eight categories, six control and two service); and (3)indicators of the ecological environment (nineteen ecological

variables, including demographic characteristics, housing conditions, living standards and consumerism, and the physical structure of the community) (Cho:440-444).

Cho's findings are interesting. Public policy seemed to have more of an impact on crime rates than on crime rate trends. In fact, none of the policy measures was significantly related to any of the indices of crime rate trends used in the study. It was found that service policies affected crime rates more often than control policies. However, the relationships between crime rates and public policy seemed somewhat inconsistent to Cho.

> In general, when policy levels are high for services for environment and for professionalism of criminal justice employees, prison manpower, prison facilities, judicial procedures, and localization of criminal justice financing, the occurrence of various crimes tends to be significantly less frequent. On the other hand, when the policy levels are high as measured by expenditures for various criminal justice functions, police manpower, and services for opportunities, the crime rates tend to be correspondingly high (Cho:453).

Cho concluded that the most significant deterrent to crime in large cities was most likely an improvement in correctional policies as well as in environmental policies.

In 1973, the Council on Municipal Performance published the results of a study involving crime in large American cities. The C.O.M.P. study was an attempt "to determine which factors lead to differences in crime rates in thirty of the largest United States cities, and what actions municipal governments can best undertake to reduce the incidence of crime" (C.O.M.P.,

1973:563). It was a comparison of the cities which seemed most and least successful in their efforts to control crime.

The researchers selected the variables for their study on "theoretical grounds" (i.e., the results of past research), and included population size, population density, population stability (emigration from city to suburbs), age structure, racial composition, poverty, inequality in income or wealth, weather (or season), patterns of drug usage (narcotics and alcohol), political violence, police employment and resources, prison sentences (deterrence?), courts, and other factors (including such things as crime prevention techniques--target hardening and environmental design).

The findings of the C.O.M.P. study can be summarized as follows:

1. Crime rates are linked to many factors.
2. Population size does not affect crime rates.
3. The relationship between property crimes and population density is not significant.
4. The correlation between violent crime and population density is positive and highly significant.
5. The correlation between robbery rates and emigration rates for whites (to the suburbs) is positive and highly significant.
6. Those under twenty-one years of age (twenty-nine percent of the population) commit sixty-eight percent of the property

crimes and forty-one percent of the violent crimes; those under twenty-five years of age (forty-six percent of the population) commit eighty percent of the property crimes and sixty percent of the violent crimes (in the U.S. as a whole). Excluding infants from this age grouping makes the disparity even greater. Excluding the aged makes a less significant difference.

7. There is a positive relationship between violent crime and the Black population. Blacks (eleven percent of the population) commit thirty-five percent of the three "serious" property crimes, sixty-eight percent of all murders, and seventy percent of all robberies (in the U.S. as a whole).
8. There is no relationship between poverty and property crimes; the relationships between poverty and violent crime, and between unemployment and both violent and property crimes are not significant.
9. Income inequality is correlated positively with both violent and property crime.
10. Weather does not help explain crime rates.
11. Cities with more police per capita have higher rates of crime; there is no relationship between more police hiring and reduced crime rates.
12. Crime rates are not correlated with clearance rates (by arrest) without regard to the subsequent court disposition

of a case.

The council concluded that crime rates were influenced by a number of factors which were "beyond the control of city or even state governments" (C.O.M.P.:562).

Haynes (1973), using 1960 crime data for a sample of U.S. cities,[1] sought to explain why large cities have higher crime rates than small cities. He found that there was no simple relationship, "of either a linear or power function type", between crime rates and a city's population size or density. The explanation for variations in crime rates amongst cities appeared, instead, to be linked to the density of interaction opportunities (Haynes:164-165).

Greenwood and Wadycki (1973) also using 1960 data, carried out a study of 199 SMSAs with the use of a simultaneous equations model to link police expenditures to crime rates. There were two crime rate equations: crimes against persons and crimes against property. The results corroborate some of the findings of Pressman and Carol (1971), but contradict several others. Greenwood and Wadycki's findings are summarized below:

1. The correlation between the per capita police variable and both crimes against persons and crimes against property is positive and highly significant;
2. The relationship between the poverty variable and both crimes against persons and crimes against property is positive and highly significant;

3. The population density variable is negative and not significant in both crime-rate equations;
4. Percent Black is positive in both crime-rate equations, but significant only for crimes against persons;
5. Owner-occupied housing values exert a significant positive influence on crimes against property;
6. The relationship between police expenditures and both crimes against persons and crimes against property is positive and highly significant.

Swimmer (1974) also wished to measure the impact of police expenditure on crime rates. His model was an economic one which assumed that criminal behaviour was rational and based on a gains and losses calculus, "that the decision to commit crime is based upon gains from successful crime, the losses if apprehended and convicted, the likelihood of being convicted, and the sociological or psychologically determined tastes for crime" (Swimmer:294). Swimmer hypothesized a dual relationship: higher crime rates are directly related to greater public demand for more police expenditure; as per capita police expenditures increase there is a higher probability of arrest which leads to lower crime rates.

The crime data for the study came from the U.C.R. for 1960 and included property crimes (robbery, burglary, larceny, and auto theft) and violent crimes (murder, rape, and assault) for cities of 100,000 population and over. The model contained two

equations, the supply of crime and the demand for police.

> In the supply of crime equation, crime rates depend upon per capita police expenditure, the expected sentence, median income, unemployment, the teenage schooling rate, the percentage non-white, the distribution of income, the South, non-South dichotomy and city population. The demand for police equation hypothesizes that per capita police expenditure depends upon crime rates, median income, per capita property tax receipts, and demographic variables (Swimmer:302).

Swimmer believed that two-stage least squares estimation techniques were superior to ordinary least squares regression in attempting to "disentangle the dual relationship" stated in the hypothesis.

Swimmer's findings showed that while property crimes were significantly related to the demand for police, violent crimes were not. Of all the socio-economic variables used in the analysis, "the unemployment rate and the schooling rate have the least explanatory power"; neither was related to property or violent crime. There was no relationship between median income and property crimes. The distribution of income was not related to violent crime, but was found to be positively related to property crime. The proportion of the population which was non-white turned out to be a better predictor of violent crime than of property crime.

Spector (1975) employed multiple regression analysis in his investigation of violent crime in American cities. He obtained his violent crime index from the Uniform Crime Reports for 103 SMSAs of 100,000 population and over in 1970. His purpose was to

discover the relationship of unemployment and population density to the violent crime rate.

Spector used five independent variables in his analysis: two measures of density (population per square mile and homes with more than one person per room), the unemployment rate, the total population, and the region of the country. He found a strong relationship between violent crime and both city size and the area of the country. But he found no relationship between violent crime and either measure of density or the unemployment rate. Spector concluded that "the current study would suggest that it is the specific characteristics of large cities vis-a-vis smaller cities that contain the causes of violence" (Spector:401).

The effects of population density on crime rates was a principal concern of McCarthy, Galle, and Zimmern (1975). The authors proposed a population density explanation, vis-a-vis a subculture-of-violence thesis, for variation in violent crime rates among U.S.cities.

Their analysis utilized comparable data sets for 1940, 1950, 1960, and 1970. The crime variables were homicide and assault rates for 171 cities divided into three geographical regions. The independent variables included four measures of population density: the number of persons per square mile; the number of rooms per dwelling unit; the percentage of the population "living in circumstances of more than 1.51 persons

per room"; and population size. Other variables were percent non-white, percent males 15-29, percent poor, and a "Southern Index".

The results demonstrated some support for both the subculture-of-violence thesis and the density thesis at different points in time. But an examination of the mean values over time indicated that no simple interpretation was possible. What McCarthy, et al., found was that, in each region, both homicide and assault rates had increased "dramatically"; population density had declined and the number of rooms per dwelling unit had increased over time; high crowding had declined "dramatically" over time, but was still (in 1970) highest in the southern region; population size had increased; percent poor had decreased; the proportion of the population who were young males had increased "slightly"; percent non-white had increased in the north and west, but remained stable in the south (McCarthy, et al., 1975:783).

The authors pointed out that while crowding had decreased, the number of persons living alone had increased, suggesting that perhaps "isolation, rather than overcrowding may be the more serious problem for modern urban society". Since the density argument was not borne out by an examination of trends over time, the authors felt that deterrence theory might prove more fruitful in attempts to understand trends in the rates of violent crime.

In his book The Geography of Crime and Justice (1974), Keith Harries reviewed some of the variables which have been related to inter-urban crime patterns in previous research, namely, city sizes and settlement types, population age and sex structure, minority population characteristics, and other factors, most notably those included in the studies of Ogburn and Schuessler.

Harries then developed two models, one of general crime and the other of violent crime, which "are based on the generalization of thirty-two social indicators and seven Index crime measures for 134 SMSAs". Through factor analysis the thirty-two social indicators were reduced to nine factors: (1) SMSA size; (2) population change; (3) Black population; (4) youth; (5) unemployment; (6) suburban population density; (7) social disorganization; (8) manufacturing employment; and (9) income.

Harries found that SMSA population size, income, social disorganization, population change, unemployment and Black population were all positively related to general crime rates, made up principally of property offences, with SMSA size making "the largest single contribution to the explanation of general crime variation among the 134 SMSA's under review". Levels of manufacturing employment were inversely related to general crime. Violent crime was related positively to Black population, SMSA size, and population change, and negatively to income,

suburban population density, and unemployment, with the Black population factor as the major element in the explanation of inter-urban patterns. Harries also outlined a crime typology of SMSAs, grouping together metropolitan areas which have similar crime profiles.

In 1976 Harries published two studies concerning inter-urban crime. Both utilized incorporated cities of 25,000 or more inhabitants, rather than the largest SMSAs, and both used much larger samples of cities than had previously been the case.

In one study, Harries reduced thirty variables (including crime categories) into eight factors: (1)poverty; (2)native-born status; (3)city revenue; (4)residential stability; (5)home construction; (6)city size; (7)population age; and (8)crime. He also identified high and low crime cities.

Harries regarded his poverty factor as a "surrogate for 'crowding' and 'relative deprivation'". He found that the low crime cities were incorporated "white noose" suburbs of metropolitan areas. Residential instability and large population size were associated with high crime rates (Harries, 1976a).

In the other study, Harries used canonical correlation analysis to derive his correlations between twenty-five independent variables and five crime rates. He found that indicators of urban pathology, especially those connected with the Black population, were associated with high crime rates.

Residential stability was inversely associated with crime rates, thus confirming the view that "low income places with young transient populations are criminogenic". Black population characteristics, residential stability, economic status, and population age were among the best predictors of crime rates (Harries, 1976b).

Flango and Sherbenou (1976) used an even larger data base than Harries. They used 840 U.S. cities grouped into two sizes, those above and below 100,000 population. Through principal component analysis they reduced ninety demographic and socio-economic variables to six independent factors: (1)affluence; (2)stage in the life cycle; (3)economic specialization; (4)expenditures policy; (5)poverty; and (6)urbanization. The authors then performed a step-wise multiple regression with their six factors as the independent variables.

Urbanization and poverty were found to be the most important variables in explaining the rates of robbery and auto theft, and of aggravated assault and burglary, respectively. Only auto theft was influenced by expenditure policy. The pattern was somewhat different for the South, where urbanization was found to be related to property crimes, stage in the life cycle was the second most important criminogenic factor, and manufacturing was related to high crime rates. Flango and Sherbenou obtained better relationships between the six factors and crime rates in large cities than in medium-sized cities,

especially for robbery and auto theft. The authors concluded that "urbanization" better explained variations in property crime rates, whereas "poverty" was more relevant to explaining rates of personal crime. That large cities of 100,000 or more people were not representative of all cities was also evident from the results.

Booth, Welch, and Johnson (1976), as had many before them, looked to crowding as an explanation of the variation in crime rates among U.S. cities. They relied on several theoretical perspectives, namely frustration - aggression, differential association, and illegitimate opportunity structure, to explain the effects of both community and household crowding on the rates of violent and property crime. They used 1967 crime data and 1960 population figures for 656 cities. Large cities (100,000 or more people) and small cities (25,000 to 100,000) were analyzed separately.

Two measures of crowding were used, household density (percent households with more than 1.00 person per room) and areal density (dwelling units per square mile), as well as percent non-white, percent foreign-born, median age, percent with incomes less than $3,000, percent with less than five years formal education, total population, and regional location.

Results of the multiple regression analysis showed that areal density in large cities "is related to a greater extent with property crimes than with personal ones, but household

crowding is little related to either...". Household crowding appeared to be related to both violent and property crimes in cities with high areal density, but explained less variance in small cities than in large cities (Booth, et al., 1976:303).

Chapman (1976) employed an economic model in an attempt to test his assumption that "crime and police are two interdependent phenomena". He developed "a simultaneous model of crime causation, police output and demand for police...", using a two-stage least squares estimation technique in his analysis.

Chapman's sample consisted of 147 cities in the state of California with populations between 20,000 and 100,000 in 1960. The crime data were taken from the California State Bureau of Criminal Statistics (1961 and 1971). Other variables used in the analysis were drawn from the U.S. census and various state sources.[2]

The author's findings supported his expectations. (1)The probability of being arrested related significantly to reduced property crime, but had little effect on violent crime. (2)Improvements in police-minority relations were related to increased police arrest production. (3)Property crimes had a significant impact on the demand for police. (4)Both economic and environmental variables had an impact on crime rates, and hence, "play an important role in the explanation of crime" (Chapman, 1976).

Danziger (1976) also employed an economic model in his examination of the relationship between unemployment and population density on crime rates. He used two crime categories in his analysis: robbery, representative of violent crime; and burglary, representative of property crime. The number of crimes was averaged over three years -- 1970, 1971 and 1972.

Danziger's findings, which conflict with those of both Spector (1975) and Swimmer (1974), were essentially as follows:

1. There are significant positive correlations between both robbery and burglary rates and income level, income inequality, and male unemployment.
2. A greater probability of imprisonment (deterrence) is related to a reduced burglary rate, but is not significant for robbery.
3. City population size is positively related to both burglary and robbery rates, robbery rates to density, and burglary rates to the growth rate.
4. Compared to the western region, robbery rates are significantly lower in the northeastern region and burglary rates are lower in the northcentral region.
5. "The educational variables generally are not significant, but an increase in the percentage of the population with a college degree significantly reduces the robbery rate" (Danziger:295).

6. There is a significant positive relationship between increases in the proportion of the Black population and both the robbery and burglary rates.

Jones (1976) did a study of crime rate trends from 1958 to 1970. He looked for longitudinal relationships among changes in eight major categories of crime, as well as associations between changes in crime and changes in socio-economic conditions. He examined trends in 155 U.S. cities with a 1968 population of 100,000 or more.

The correlational and regression analysis showed no association over time among the changes in personal crimes; however, there was a relationship among the changes in property crimes, suggesting that "they share much the same set of causes and that the same policy might be directed at all crimes against property" (Jones: 336). Jones also found that changes in the proportion of Blacks is positively related to changes in most crimes, but that changes in income (poverty) were not related to changes in crime rates. This finding prompted Jones to suggest that "much more detailed empirical studies of the noneconomic ways in which a population's racial distribution affect crime incidence" be pursued. A positive relationship between changes in the proportion of young males and changes in the rates of robbery, burglary, and grand larceny suggested to Jones that "more attention be given to the ways in which the passage of

different - sized age cohorts through a city's demographic structure affects an area's social problems" (Jones, 1976:338-339).

Skogan (1977) conducted a time-series analysis to investigate "the changing relationship between the aggregate demographic characteristics of cities, their investment in policing, and officially reported rates of crime". He believed that "the geographical distribution of crime is an evolving phenomenon". Skogan thought that large, dense, racially heterogeneous urban areas had the highest crime rates, but that this was a relatively recent development which reflected a process of "suburbanization". His study was really a test of Louis Wirth's theory of "urbanism", the key concepts of which are population size, density, and heterogeneity. Urban centres with larger populations, greater density, and greater heterogeneity are more impersonal, anonymous, and transitory than non-urban places, and more likely to produce conflict among their inhabitants.

> Personal disorganization, mental breakdown, suicide, delinquency, crime, corruption, and disorder might be expected under these circumstances to be more prevalent in the urban than in the rural community (Wirth,1938:23).

Skogan's study is also a test of what he refered to as the "normal model" of crime and social control. This is also a Wirthian idea, that cities demand greater formal social control and are less tolerant of deviance. This model, says Skogan,

underlies most aggregate or ecological research.

Skogan used 1970 data for the thirty-two largest cities in the United States in his analysis. He used indicators of each of Wirth's key concepts, with percent non-white as his measure of heterogeneity; formal control was measured as the number of police officers per capita. His crime index consisted of the sum of murders, robberies, and auto thefts per capita.

As a result of his multivariate path-analytic test Skogan found that all three of Wirth's key concepts contributed to the statistical prediction of crime. Together they explained seventy percent of the variance in police strength. Over the period from 1946 to 1970 "there are substantial, orderly changes in the relationships between many variables in the normal model of crime and control". However, Skogan found that the correlations between population size, density, and police strength "remained virtually unchanged" over the twenty-five year period. There was an increasingly positive correlation between race and crime rates.

It was clear to Skogan that the normal model of crime and social control was consistent with the data only for the most recent period. The Wirthian model fit intra-city crime patterns from the 1920s on. (For instance, the concentric zones of Shaw and McKay varied more or less along Wirth's three dimensions). Now Wirth's model fits the metropolitan patterns of crime. Skogan suggested that this shift in the social ecology of urban

systems was the result of the growth of suburbs.

Suburban crime patterns were the subject of a study by Stahura, Huff, and Smith (1980), in which structural models of violent and property crime rates were developed and analyzed. The authors used 645 suburbs[3] in their analysis, and U.C.R. data for 1970. Their crime rates were based on the average number of offences over three years, 1970, 1971, and 1972. Violent crime was represented by rape, homicide, assault, and robbery; property crime consisted of larceny, theft, auto theft, and burglary (the number of incidents per 100,000 population). Predictors of crime rates, such as measures of socio-economic status, population size and density, age composition, and ethnic composition, were grouped into two broad categories: population characteristics and physical properties.[4]

Stahura, et al.,. found that (1)suburban physical characteristics (population size, density, the employment/residence ratio, and region) had direct as well as indirect effects on crime rates; "region has the largest direct effect on property crime rates". (2)Suburban age was not significantly related to crime rates. (3)The relationships between percent youth and crime rates were spurious. (4)Percent low-income population, "a key variable" in explaining crime rates, had direct effects on both violent and property crime. (5)Percent Black population "had both direct and indirect effects on violent crime rates", but was not significant for

property crime rates (Stahura, et al., 1980:304-311).

Huff and Stahura (1980) tried to show that police employment was "causally related" to crime rates. They obtained their crime data from the usual source, the Uniform Crime Reports, for 252 northern and northeastern suburbs. Their rates for violent crime (rape, homicide, assault, and robbery) and property crime (larceny, theft, auto theft, and burglary) were averaged over a three year period, 1970, 1971 and 1972. The independent variables included density, racial composition, poverty composition, age composition, population size, and police employment.

The findings of Huff and Stahura suggest there are "positive reciprocal effects of violent crime on police employment, and police employment on violent crime". The areas with higher crime rates had the highest rates of police employment regardless of size, density, racial composition, age composition, or SES composition. Police employment was not affected by property crime rates; and the effects of population size and density on crime rates and police employment were small. It was found that the proportion of Blacks exerted substantial "indirect" effects on both violent and property crime; percent Blacks was moderately related to violent crime rates. Age composition had a relatively strong relationship with property crime, but only a weak relationship with violent crime.

The functional specialization of cities was the concern of a study by Brantingham and Brantingham in 1980. Their unit of analysis was SMSAs of 250,000 population and over. The crime data for the seven major index crimes were taken from the Uniform Crime Reports, and the economic, occupational, and background data were taken from the U.S. Census, all for the year 1970.

The Brantinghams' analysis consisted of three steps. Zero-order correlation coefficients were obtained for each crime category, and between crime rates and the other variables. Then, multiple regressions were run for each crime. Reduced stepwise regression models were run, "subject to the restriction that the independent variables were not highly correlated. Finally, the results were examined crime by crime using an opportunity-motivation matrix conceptual rubric".

The Brantinghams' findings showed murder and assault associated with motivational variables ("ethnicity, ignorance, recent in-migration, poverty, and/or employment at menial occupations"); the economic specialization of a city did not seem to be related to murder and assault rates. Burglary and larceny rates were high in cities "which specialize in entertainment and in finance, insurance, and real estate..., and to a lesser extent, in government and FIRE" (finance, insurance, and real estate). Cities specializing in manufacturing had low rates of burglary and larceny, which confirmed previous

findings. Unemployment was related to larceny rates, but not to burglary rates.

Both robbery and auto theft were associated with opportunity variables. Robbery correlated positively with city size; auto theft was correlated with population, clerical female workers, and mean income. Rape rates were associated with both opportunity and motivational variables. "The cross-product of two economic specializations--FIRE and entertainment--contribute almost half the explained variance". And "percent Black, percent young males, high residential mobility, and percent of workers in low-skill occupations also matter" (Brantingham and Brantingham, 1980:12). Thus, inter-urban variations in economic specialization and occupational patterns did seem to help in the prediction of inter-urban variations of some crime rates, notably burglary, larceny, and rape and perhaps robbery and auto theft.

Worden (1980) has suggested "the perception of relative deprivation" as an explanation for the variation in inter-metropolitan crime rates. Using simple correlation and stepwise linear regression techniques Worden analyzed data for a sample of 120 SMSAs. Fifty-two independent variables were used for 1960 and twenty-four for 1970, with ten crime variables.

The results for both years were quite different. "In 1960, SMSA population growth, crowding, and population rank were the best predictors of total crime, property crime and burglary",

whereas in 1970, the best predictors of these crimes were "the concentration of youthful minorities in the central city and the size of the Spanish-speaking population in SMSAs..." (Worden:117). In all of Worden's models, absolute differences between the central city and the rest of the SMSA were insignificant. And yet, the structure of the variables suggested differences. The author felt that the concept of the perception of relative deprivation was more applicable than that of absolute deprivation. "Theoretically,... the perception of difference, not the actual difference, is what propels this criminogenic relationship" (118). Worden cited the findings of previous research, notably those of McCarthy, et al., (1975), Booth, et al., (1976), and Harries (1976b), as further support for his thesis.

To recapitulate, inter-metropolitan research in the United States indicates that high crime cities are generally characterized by a relatively large population; greater population density; a greater rate of population change; a higher proportion of young, single persons, especially males 15 to 24 years of age; a higher rate of male unemployment; a higher proportion of people with low incomes and low socio-economic status generally; a higher rate of migration; a larger Black population; and a higher police to population ratio.

Low crime cities seem to have relatively larger families and more children; a larger proportion of foreign-born whites; a

larger church membership; higher rents; greater residential stability; a greater degree of home ownership; high income levels; a greater proportion of the population engaged in manufacturing; a larger proportion of the population 55 years of age and over; and fewer women in the labour force. Population attributes associated with high and low crime rate cities can vary both in direction and significance depending upon whether one is looking at property crimes or violent personal crimes.

Methodological Issues

There are a number of methodological problems associated with ecology of crime research. The lack of theoretical development in ecological criminology is directly related to other problems, such as problems of definition, aggregation, techniques of analysis, and a group of conceptual problems usually referred to as the "ecological fallacy" where properties of aggregates are assigned to individuals.

Wilks has pointed out that ecological criminology is really a "potpourri of studies". There is little or no interlocking of ecological research with an eye toward constructing a systematic explanatory theory.

> That is, empirical regularities discovered in distributional descriptions could point the direction for searches for correlates of differential distributions, which could in turn lead to the formulation and testing of sets of interrelated hypotheses concerning observed relationships, and the eventual formulation of systematic theory which could

> explain the ecological distribution of crime and delinquency (Wilks, 1967:139).

Instead of a cohesive theoretical system, we find the very subject matter of the ecology of crime in dispute; criminologists disagree as to what the field of inquiry should encompass.

Another problem, Wilks claims, is that researchers are content with finding associations between crime rates and population attributes, and do not follow through to discover the significance (the source) of the differential distribution, not only of crime rates, but also of the variables associated with the variations in crime rates. "If crime rates are associated with some process such as anomie, why is anomie differentially distributed among population aggregates?" (Wilks:139).[5]

Ecological studies have a tendency to explain their findings post hoc by referring to existing theories of crime and delinquency. Many researchers use such studies to provide support for one or another of the existing explanations of crime. In fact, the results of a number of studies, such as the one carried out by Schuessler and Slatin (1964), could be used to confirm several different theoretical models.

Related to this is the fact that many researchers have avoided explanations which their findings would seem to make obvious. Economic explanations have often suffered such a fate, researchers preferring, instead, more ambiguous explanations of

crime rates, such as anomie or social disorganization (Glaser & Rice, 1959). Lander (1954) for example, ignores the fact that most of his variables have economic implications and insists upon an anomie interpretation of his results.

An important problem in research methodology is definitional in nature. The definition of crime that a researcher chooses can significantly affect both the absolute rate of crime in an area and its distribution throughout the social structure. The various ways in which crime rates are calculated also affects results and makes comparisons of studies difficult. Ogburn (1935) used a general crime rate in his analysis while Schuessler (1962) used crime-specific rates. Boggs (1965) used crime-specific rates based on the population at risk, rather than on the population as a whole. Schmid (1960) considered the place of offender residence as well as actual crime sites in his attempt to analyze crime in Seattle.

But the definitions of crime constitute only part of the definitional problem. It is often the case that the socio-demographic variables used in the analysis are ill-defined, both nominally and operationally. In fact, operational definitions are usually inappropriate primarily because the nominal definitions are unclear and inadequate. In many studies -- again, Schuessler and Slatin (1962) is an example -- there is little or no justification given for selecting the variables used to represent certain population

characteristics.

Selecting the appropriate measure of a population attribute is not always an easy matter. (It is often the case that the measure desired by the researcher is not available, and a substitute variable is used). For instance, what constitutes a measure of density? -- The number of persons per square mile? The number of persons per room? The number of dwelling units per structure? The number of dwelling units per acre? The number of rooms per housing unit? Many studies have used the number of persons per square mile as the measure of population density, but the C.O.M.P. (1973) study recommended that it be calculated on the basis of "total floor space". There is also the possibility of confusing the concepts of "density" and "crowding" -- "the number of persons per unit of space" and "the experience of being uncomfortably congregated", respectively. (Nettler, 1978:157)

How does one measure socio-economic status (SES)? -- income level, occupation, educational level, type of housing, or a combination of these? What is "urbanism"? Wirth (1938) and many others thought it had to do with population size, density, and heterogeneity. It might also be the rate of population growth, the rate of urban expansion, population mobility, family instability, and women in the labour force. Pressman and Carol (1971) used density and/or net migration rates as their measures of "urbanization". Which population characteristics represent

such concepts as "anomie" and "social disorganization"?[6]

The size of the unit of analysis can also affect the results of ecological research. Studies of the distribution of crime rates have employed a variety of aggregate sizes -- census tracts, square-mile areas, concentric zones, neighborhoods, cities, metropolitan regions, regions, and states. At the inter-urban level alone, different sized aggregates can be a problem, especially for comparison purposes. Ogburn (1935) and Schuessler (1962) used cities; Harries (1974) and Eberts and Schwirian (1968) used SMSAs; Huff and Stahura (1980) used suburbs. Most studies focus on large cities or metropolitan areas, but there is some doubt as to whether generalizations about the distribution of crime hold across different sized aggregates (Wilks, 1967; Schuessler and Slatin, 1964).

Many ecology of crime studies border on tautologies. The tautology exists in the relationship between crime, the phenomenon to be explained, and the explanatory variables used in the analysis. The use of factor analysis has greatly facilitated this tautological relationship. Some researchers, for example Schuessler (1962) and Schuessler and Slatin (1964), have included the conceptual dependent variables (the crime categories) in the factor analysis along with the conceptual independent variables. Thus, the factors extracted from the analysis consist of those variables to be explained (the crime variables) as well as the variables which might explain the

occurrence of crime. As Wilks has said, "the dimensions which have been 'discovered' have included not only the explanatory variables but also the explicandum" (Wilks, 1967:139). Factor analysis, to be of any use, should be carried out on the crime variables and the independent variables separately. After all, "a factor which includes the crime to be explained is not of great value" (Nettler, 1978).

Mention should be made here of what has come to be called the ecological fallacy. Two aspects of the ecological fallacy have importance to crime and delinquency research and the results obtained: (1)using area studies as a foundation for conclusions about causes, and (2) assuming that associations found among events when one has studied aggregates will also be found when one studies individuals (Nettler:137).

In ecological studies of crime, the assumption of causality is often made for relationships found between crime rates and socio-demographic variables. However, as Nettler points out, causation cannot be inferred from a correlation. Not everything that "goes with" the event to be explained has produced it (Nettler, 1978:120).

Robinson (1950) has pointed out the fallacy of ascribing aggregate characteristics to individual criminal behaviour. Those who work from economic models to explain crime rates seem especially prone to this type of error. Chapman, for example, states that

> ...the environment of an individual has an influence on his behavior. If the environment is such as to encourage crime, then it would be expected that the individual in that environment would be more likely to commit crime. Thus, when community ecological variables are used in the model, what is really being done is postulating a specific crime-causing situation in a community, and then measuring the effect this situation has on the community crime rate (Chapman, 1976:51).

Another problem of economic models of crime is that they assume the rationality of criminal behaviour, and analyses of crime rates usually revolve around the deterrent hypothesis. (Chapman, 1976; Swimmer, 1974; Danziger, 1976; and Cho, 1972) However, a number of writers have recognized the difficulty of measuring a general deterrent effect. "Observing what people do not do is impossible in the abstract" (Nettler, 1978:345). Gibbs states the problem clearly when he says that "the term [deterrence] denotes an inherently unobservable phenomenon" (Gibbs, 1975:3).

The methodological issues briefly discussed here are some of the more important problems in ecology of crime research that make the interpretation, as well as the comparability of results difficult.

Notes

1. The sample consisted of 86 cities; the 6 largest cities plus random samples of 20 from each of four size categories (a population range from 26,000 to 7 million.) The categories were 25,000-50,000; 50,000-100,000; 100,000-250,000; 250,000-1,000,000 plus New York, Chicago, Los Angeles, Detroit, Philadelphia, and Baltimore.

2. Using data from a single state has the advantage of increased reliability. See Chapman, 1976:58.

3. "A suburb is operationally defined as an incorporated place with a population of at least 10,000 located within the bounds of a standard metropolitan area (SMSA) but outside of its central city" (Stahura, et al., 1980:301).

4. (a) Population characteristics include age composition, low-income population, and Black population. (b) Physical characteristics (site and situational characteristics) include suburban age, population density, population size, the employment/residence (E/R) ratio, and the region of the country.

5. Descriptive ecological studies may be maligned because they are atheoretical, but such studies which look for baseline patterns may also be praised as part of grounded theory.

6. See Lander (1954); and Schuessler & Slatin (1964).

IV. The Study

General Orientation

The present study is an attempt to discover and analyze the patterns of crime, as they relate to various population characteristics at the inter-urban level, in the Province of British Columbia. This is not intended to be the definitive ecological study of crime in B.C.; rather, it is a first step towards presenting a more accurate and informative picture of urban crime in the province using the best available data.

There has been almost no research of this nature done in Canada and it is generally assumed that crime patterns in this country parallel those in the United States, where the bulk of inter-urban research has been carried out. It would be worthwhile to examine the variations in crime rates amongst urban areas in B.C. to see whether or not this assumption is confirmed.

Most American research in the ecology of crime has focused upon the largest cities or metropolitan areas. Those studies which have looked at smaller cities suggest that the findings for large cities may in fact not hold for smaller cities and towns. In fact, city size and population density are considered

to be among the most important determinants of urban crime rates. It would be interesting to see if these variables play such a role in a Canadian context.

A number of hypotheses have emerged from both intra-urban and inter-urban ecological research which can be tested in the context of British Columbia. Some of the most frequent and important of these hypotheses are introduced for consideration in the present study.

1. Higher crime rates are associated with
   a. greater size and density of the urban population;
   b. greater ethnic heterogeneity;
   c. more rapid growth, or a declining population;
   d. a higher proportion of young, single males in the population;
   e. a higher rate of male unemployment;
   f. a higher proportion of people with low socio-economic status;
   g. more movement of people into and out of the community; and
   h. more police personnel per capita.
2. Lower crime rates are associated with
   a. home ownership (a higher proportion of owner-occupied dwellings);
   b. a higher proportion of the population 55 years and over; and

c. a lower proportion of women in the labour force.

A number of questions have yet to be answered concerning inter-urban crime patterns in B.C., some of which we would like to explore in the present study.

1) What population characteristics are associated with high (or low) crime rates in B.C. cities? And which seem to have the greatest influence in determining the rates?

2) Do inter-urban crime patterns in B.C. compare to those in the United States, or are they substantially different?

3) Is crime in smaller communities associated with the same attributes as it is in larger cities? What are the differences, if any?

4) Do the patterns for violent personal crimes differ from those for property crimes?

The variables examined in ecological research can generally be grouped into four broader categories: (1) City structure; (2) Demographic characteristics; (3) Social characteristics; and (4) Economic characteristics. The city structure category includes such variables as city size, population density, housing characteristics, functional specialization, location and area in the metropolitan region. Demographic characteristics include the age and sex structure, mobility and migration, birth and mortality rates. Social characteristics encompass such

things as ethnic heterogeneity, family structure, marital status, education, and occupation. Income and unemployment are considered economic characteristics. Obviously, there are some socio-economic variables which would fit into more than one category, or into a separate category, depending on the interpretation and desires of the researcher. Housing, education, income, and occupation, for example, are often considered, collectively, to indicate socio-economic status. The present study will look at variables which are intended to be measures of each of the four types of attributes mentioned above.

Data Sources

A great deal has been written concerning the use of official statistics in criminological research; indeed, virtually every study employing an ecological approach to the investigation of crime and delinquency makes mention of the problems inherent in the use of such data. Despite the fact that discussions on this subject can be found elsewhere,[1] some brief comments about the use of official statistics are appropriate here, especially as it concerns reliability and validity.[2]

The observation has been made that "all social statistics are imperfect measures of whatever they are supposed to indicate" (Nettler, 1978:59), and criminologists have long been aware that the actual amount of crime is far greater than that

which is known to the police. The reasons why this is so are many and varied. The amount of hidden crime (referred to as the dark figure) varies widely depending on the nature and seriousness of the offence; and crime statistics are flawed, not only because of what is and what is not counted, but also because of who does the counting (Nettler, 1978).

Official crime statistics, or "crimes known to the police", published in the Uniform Crime Reports, are limited to offences which are detected, reported and recorded, and their quality is dependent on the diligence and accuracy, the limitations and biases, of the police. That is to say, the variations in crime rates are, at least in part, the result of differences in reporting and recording (Fattah, 1980:89).

Besides police statistics, there are two alternative sources of quantitative crime data:[3] victimization surveys and self-report studies. Victimization surveys are questionnaire studies in which the respondents are asked whether or not they have been the victim of a crime within a given time period. It is believed that victimiztion surveys present a more accurate picture of the frequency and distribution of crime than that contained in the U.C.R. Comparisons of victimization survey findings with police data provide rough estimates of the amount of hidden crime for various offence categories. These studies also provide useful information as to why criminal victimization is not reported to the police. The findings of victimization

surveys over the years have remained remarkably consistent, in spite of improved samples and methodology. Studies of victims in the United States have shown that many more crimes are committed than are reported in the Uniform Crime Reports. In a national survey it was found that about twice as many serious crimes were committed as were known to the police in 1966. Only a third of the burglaries were known, and a quarter of the rapes. In a Washington D.C. study, the population surveyed indicated that thirty-eight percent were victimized in a year as opposed to the ten percent reported by police. From three to five times as much serious crime actually occurs than is known to the police, according to the survey in Washington and another in Boston. These studies also indicate that the rate of criminal victimization is much higher in metropolitan areas than in small cities and rural areas (Hood and Sparks, 1970:25).

Self-reports, or hidden delinquency studies, are an additional source of data on crime. They question people as to whether or not they have committed any offences in a given period of time. Most self-report studies have used juveniles, usually school children, in their samples. It is questionable that the results of such studies can be generalized to adult populations.

Because victimization surveys and self-report studies are questionnaire studies, they both suffer from many of the same methodological problems. Self-reports, however, are considered

less useful as a source of crime data. Although such studies have added to our knowledge of delinquency, "their methodological problems and parochial nature have handicapped their ultimate usefulness in measuring crime". Victimization surveys are believed to provide "a superior alternative for counting crime" (Silverman and Teevan, 1975:77).[4]

In criminological research one is usually interested in three ways of expressing measures of crime and other social problems: ratios, proportions (or percentages), and rates. A ratio compares one segment of a population with another, where both numbers come from the same tally. A proportion describes the relation between a part of a population and the whole. A rate compares events during a specified time period against some population base.[5]Measures of crime in a community, region, or nation are usually expressed in rates, the idea being "to express the relationship between the actual and potential" (Nettler, 1978:73).

To increase predictive power, the denominator of a rate should only include the persons, or the targets, which are at risk. "Comparisons between populations become more accurate, then, when the rates employed are age-specific, sex-specific, and density-specific" (Nettler:73).[6]Giffen points out that the use of the population of an area as the denominator in calculating crime rates is often of questionable validity. "In crimes against the person, population is probably the best crude

measure of opportunity that is available; but the same is not true for crimes that involve access to property" (Giffen, 1976:87).

In order to calculate rates one must have access to sources of data other than criminal statistics. Data regarding the characteristics of populations of cities, regions, and nations are published at regular intervals as government census information.[7] However, opportunity rates for a number of offences are not now available in official statistics, either criminal or census, at least not in Canada. Consequently, one is forced to use population as the base in calculating crime rates.

If our aim is to map the patterns of crime we need data in which we have some confidence. No one in criminology is completely happy about the state of official statistics, and the problems concerning the reliability and validity of such data have raised serious doubts as to their value as indices of crime. Nevertheless, we do not have better indices of crime available to us at present. Nettler has pointed out that,

> ...if these imperfect indicators are used to gauge approximate qualities of the serious crimes by their social locations and if different measures tend to draw similar maps, then we have increased confidence in our picture of reality (Nettler, 1978:59).

There is, as yet, no information available for the Province of British Columbia through the use of either victimization surveys or self-report studies. As a consequence, data for the present study come from official sources. Crime data for this

study were obtained from the files of the British Columbia Police Commission -- the year-end figures for all categories of crime known to the police. From this source, data were gathered for most of the serious criminal code offences for the 56 municipalities in the province with a population of 5,000 and over. The municipalities examined in this study are the same ones used in the B.C. Police Commission Bulletins' "Municipal Crime Trend Comparisons".[8] Most of these municipalities are policed by the Royal Canadian Mounted Police on a contract basis, but twelve of them have their own police forces.[9]

Data were gathered for the three years 1975, 1976, and 1977 in the following crime categories:

1. Sex offences: a. Rape; b. Indecent assault, female.
2. Total assaults.
    a. Wounding
    b. Assault causing bodily harm
    c. Other assaults (common assault)
3. Robbery.
4. Total breaking & entering and theft.
    a. Breaking and entering & theft, business
    b. Breaking & entering and theft, residence
5. Theft of motor vehicles
6. Theft over $200

The number of reported sex offences in B.C. is quite small, so rape and indecent assault on females have been combined in a

single crime category for purposes of the present analysis. Sex offences against males are not included so that the present sex crime category will remain as much as possible like the "rape" category used in most U.S. research studies.

Only the most serious assaults have been included as separate crime categories in the present studies; wounding and assault causing bodily harm have been combined in a single category for analysis. Offences such as assaults on police officers are too few to make their addition worthwhile, although they are included in the "total assaults" category.

The most notable difference between the present study and other studies of this nature, in terms of the crime categories used, is the absence of "homicide" in this study. The reason for omitting homicide here is that it has a very low rate of occurrence; the small numbers do not justify its inclusion in the analysis. The largest number of homicide cases occur in and around the city of Vancouver.[10]

The data were tabulated for each of the three years mentioned above and then averaged. This "data smoothing" was done in order to minimize any wild fluctuations from one year to the next that might occur in a particular offence category. The year 1976 was chosen as the pivotal year in the selection of crime statistics since that was the year of the last fully reported census in Canada.[11](The most recent census done in 1981 has not been reported at a municipal level.)

Police statistics, or crimes known to the police, are used here, as they are in most studies of this nature, because they are available, and because they are "theoretically closer to the true number of crimes committed than charges or convictions" (McDonald, 1969:214). Zay (1972) agrees that

> "Offences known to the police" are the closest available indication of the prevailing volume of crime and delinquency at the local, provincial, and national levels. There are offences which are known only to the persons who committed them; others are known, apart from the offenders, only to the victims themselves who do not want to report them; of all others, the largest proportion is known to the police. The police force deals with more offences than does any other law-enforcement agency" (Zay, 1972:80-81).

Lynn McDonald (1969) suggests that the efficiency of police reporting "can neither be estimated nor corrected" (McDonald:213). Nevertheless, that is just what the B.C. Police Commission has attempted. Crime statistics were audited for the twelve municipal police departments as well as for the R.C.M.P. detachments as the first step in a program to upgrade and standardize uniform crime reporting in the province. The Commission found "serious deficiencies" in the tabulation, scoring, and recording of the incidents of crime occurrance. In spite of this, it was found that certain offences -- breaking and entering, homicide, sexual offences, and theft over $200 -- have been recorded with consistent accuracy in all jurisdictions. Statistical comparisons of B.C. communities regarding other crime categories, the Commission suggests,

should be viewed with suspicion (B.C. Police Commission, Bulletin No.6, April 1979:5-6). This analysis includes specific crime type analyses where it is possible to look at the most reliable police statistics.[12]

The socio-demographic variables for the present study were selected or derived from the 1976 Census of Canada.[13] The 1976 census is a mini-census, providing less information than would a full census, the most notable difference being the lack of any information on income. Income data from the 1971 census was considered too far removed from the current situation to be reliable, since a city's income structure can change greatly in five years.

It must be pointed out that the geographical areas of census subdivisions and those of the various police jurisdictions are not always identical. The two sets of boundaries were rationalized in this study.[14]

The deficiencies in the census data used in this study will, to a large extent, be ameliorated by the information contained in the 1981 census. Future research in this area using 1981 census data could look at such things as the functional specialization of cities as well as the traditional characteristics of city structure (city size and population density, for example). More comprehensive information on income and employment, available in the 1981 census, would afford researchers better measures of such factors as socio-economic

status. For now, we must make the best use of what information is available.

Notes

1. For discussions on the use of official statistics in criminological research refer to Wolfgang (1968); McDonald (1969); Zay (1972); Silverman and Teevan (1975); Giffen (1976); Fattah (1980).

2. Reliability refers to what is counted and how it is counted (i.e., consistancy of measurement).
Validity refers to how much of the actual amount is counted (i.e., accuracy of measurement).

3. Actually, there are two other sources of official statistics--judicial statistics (courts) and correctional statistics (prisons).

4. Discussions of the value and problems of victimization surveys and self-report studies are to be found in Fattah (1980) and Silverman and Teevan (1975)

5. Examples:
Ratio - (males/females) x 100
Proportion - (males 15 - 24/total males) x 100
Rate - (no. of robberies in a given period/population) x 1000
See Nettler (1978):71,fn).

6. See Boggs (1965) and Gibbs & Erickson (1976) for discussions of crime-specific rates and rate denominators.

7. The government of Canada conducts a census of the population every five years, a full census every ten years (1971, 1981...) and a mini-census mid-way between every full census (1976, 1986...).

8. See Bulletin No. 6, April 1979, pp.7-9.

9. The twelve include Vancouver, Saanich, Delta, Victoria, New Westminster, West Vancouver, Matsqui, Oak Bay, Esquimalt, Port Moody, Nelson, and Central Saanich.

10. Homicides in B.C. totaled 94 for 1975, 89 for 1976, and 90

for 1977. Homicides in the Vancouver metropolitan area numbered 37, 38, and 33 for 1975, 1976, and 1977, respectively.

11. The purpose here was to use crime data and census data from the same year, 1976. Using crime statistics which are several years more recent than the population characteristics is viewed by some as methodologically unsound (see Higgins, et al. 1976).

12.A table of Crime Rates for the 56 municipalities is included in the Appendix. The crime rate is the average number of offences in each category over the three years 1975, 1976, and 1977 per 1,000 population. For five municipalities -- Sidney, Castlegar, Williams Lake, Comox, and MacKenzie -- data were not available before 1977, so only 1977 figures were used.

13. Statistics Canada publications. See the bibliography for the complete list of census publications used. A complete list of the variables used in this study, together with their operational definitions, is provided in Table B of the Appendix.

14. Police statistics may be reported for parts of a census subdivision as well as for the municipality as a whole. Care was taken to ensure that the census population of a municipality was the same population from which the police statistics were gathered.

V. The Analysis

Multivariate Statistical Techniques

Most ecological studies of crime and delinquency use either factor analysis or multiple regression analysis in an attempt to uncover the patterns of crime in urban areas. Some criminological studies, usually the earlier ones, deal solely with correlations between crime rates and socio-demographic attributes. The present study utilizes all three techniques to obtain a clearer and more comprehensive picture of inter-urban crime patterns in the Province of British Columbia.

There is often a considerable degree of communality amongst the socio-demographic variables used in ecological analyses of crime rates. For this reason it may not always be appropriate to look only at single independent variables and build predictor models through multiple regression analysis. Factor analysis can be used to produce clusters of variables which share common attributes.

Multiple regression analysis and factor analysis are multivariate techniques which, in general, have quite different purposes. The fundamental purpose of multiple regression is to predict dependent variables, in this case crime rates, as well

as to test hypotheses. The basic purpose of factor analysis is to reduce a large number of variables to a few clusters, or factors, each indicating the communality (i.e. intercorrelations) among the variables which make up the factor. Factor analysis has on occasion been misapplied and the results incorrectly interpreted,[1] but it can be a powerful analytic tool if properly used (Kerlinger & Pedhazur, 1973:360-361).

The present analysis of crime in British Columbia's urban areas consists of five steps. First, the zero-order correlation coefficients between crime rates and socio-demographic variables are calculated. Then, two separate factor analyses are carried out, one on the crime categories, the other on the socio-demographic variables. The fourth step involves a stepwise regression analysis with the crime rates as the dependent variables and the factor scores calculated from the factors derived from the set of socio-demographic characteristics as the independent variables. The factor scores used in this factor-regression are averages weighted according to the factor loadings. Finally, models are produced through stepwise multiple regression to discover which single independent variables best predict the various crime rates.

The stepwise procedure is used here because there is no a priori reason for ordering the variables. The variable which explains the greatest amount of variance in the dependent variable will enter the equation first; the variable which

explains the greatest amount of variance in conjunction with the first will enter second, and so on.[2] The independent variables are entered into the regression equation on the basis of pre-established statistical criteria. In the present study fairly stringent criteria were specified: a maximum of seven variables in each model (four in the factor-regression), a partial F of at least 3.0, and a .4 tolerance. The tolerance of an independent variable is the proportion of the variance not explained by the independent variables already in the regression equation. A tolerance of .4 indicates that 40% of the variance of a potential independent variable is unexplained by predictors already entered. The use of such stringent parameters ensures that the variables selected for inclusion in the equation are relatively uncorrelated with each other and have high independent predictive power.

Variables were chosen for the analysis because they were most highly correlated with the crime categories and/or they were found in previous research to be contributors to variations in the distribution of inter-urban crime rates. The full range of variables used in this study can be found in the Appendix, along with the specific sets used in the factor analysis and the regression analysis.

Findings

Zero-Order Correlations

The calculation of zero-order correlation coefficients between the crime rates and socio-demographic variables produced some interesting results. Tables 1 through 10 present the highest correlations for each of the crime categories.[3]

Table 1

Zero-Order Correlations
Sex Offences (SEXCRIME) with Socio-Demographic Variables

Positive		Negative	
LPFAMILY	.584	OWNED	-.569
DIVORCED	.579	PPR	-.557
LONEPARP	.577	HOUSESD	-.468
RENTED	.570	FAMILY	-.448
DENSITY	.491	MARRIED	-.369
APARTMNT	.491	CHANGE	-.369
SINGLE15	.475		
NOFAMILY	.458		
FEMHEADS	.438		
FEMLABOR	.430		
POP1976	.409		
FROMOUT	.409		
WDLFFEM	.387		

All correlations significant, at least, at the .01 level.

Social characteristics are the strongest correlates of sex offence rates, with the characteristics of city structure next in importance. Variables showing strong positive relationships with rates of sex crimes include single-parent families and persons in single-parent families, divorced persons, rented housing and apartments, population size and density, single persons, non-family persons, migrants from outside Canada, women in the labour force, and women who are heads of households. Home ownership and single-detached houses, married persons, family persons, population change, and the population-police ratio are all negatively related.[4]

The largest positive zero-order correlates of all three assault categories include total unemployment and male unemployment, young women who are single parents and heads of households, working people with a relatively low level of educational achievement, rented housing, and a comparatively high rate of infant mortality; married persons, children in families 15-24 years of age, students (especially male students), home ownership, and the population-police ratio are the largest negative correlates. The total assault and common assault rates, in addition, are related to single-parent families and persons in single-parent families, persons without post-secondary education as well as those with less than grade

nine, and children in families under the age of fifteen, and negatively related to full-time students and persons with university degrees.

Table 2

Zero-Order Correlations
Total Assaults (ASSAULTS) with Socio-Demographic Variables

Positive		Negative	
DEADBABY	.651	MARRIED	-.580
UNEMRATE	.549	YMENHSCH	-.505
LABFORM9	.523	PPR	-.457
YFEMLPAR	.514	SCHMALES	-.438
NOWORK	.505	KIDS1524	-.397
YFEMHEAD	.504	ATSCHOOL	-.385
LABFOR9	.503	OWNED	-.364
NPOSTSEC	.477	DEGREES	-.361
LPFAMILY	.416		
POPLES9	.387		
KIDSU15	.381		
LONEPARP	.376		
RENTED	.365		

All correlations significant, at least, at the .01 level.

Table 3

Zero-Order Correlations
Common Assault (COMMON) with Socio-Demographic Variables

Positive		Negative	
DEADBABY	.659	MARRIED	-.569
LABFORM9	.511	YMENHSCH	-.495
UNEMRATE	.509	PPR	-.446
YFEMLPAR	.488	SCHMALES	-.425
YFEMHEAD	.488	KIDS1524	-.384
LABFOR9	.485	ATSCHOOL	-.382
NPDSTSEC	.472	DEGREES	-.360
NOWORK	.463	OWNED	-.345
LPFAMILY	.404		
POPLESS9	.374		
KIDSU15	.371		
LONEPARP	.369		
RENTED	.346		

All correlations significant, at least, at the .01 level.

Table 4

Zero-Order Correlations
Serious Assaults (AGGRASS) with Socio-Demographic Variables

Positive		Negative	
UNEMRATE	.530	MARRIED	-.488
DEADBABY	.480	YMENHSCH	-.421
NOWORK	.479	SCHMALES	-.401
YFEMHEAD	.466	PPR	-.388
YFEMLPAR	.465	OWNED	-.370
LABFOR9	.421	HOUSESD	-.347
LABFORM9	.419	KIDS1524	-.346
RENTED	.370		

All correlations significant, at least, at the .01 level.

Robbery is significantly related to the greatest number of variables, representing city structure, demographic, and social characteristics. Economic characteristics do not seem to be associated with robbery rates.

Table 5

Zero-Order Correlations
Robbery (ROBBERY) with Socio-Demographic Variables

Positive		Negative	
POP1976	.743	FAMILY	-.675
DENSITY	.669	OWNED	-.608
NOFAMILY	.666	PPR	-.536
DIVORCED	.659	HOUSESD	-.524
RENTED	.608	AVEPERHH	-.475
APARTMNT	.608	AVEPFAM	-.382
FEMHEADS	.577	MARRIED	-.362
LONEPARP	.557		
KIDSU25	.540		
LPFAMILY	.532		
FROMOUT	.528		
SINGLE15	.501		
LABORFEM	.471		
FEMLABOR	.455		
FAMILYNH	.444		
WDLFFEM	.417		
MWOMRATE	.416		
MYFRATE	.403		
FAMKID18	.394		

All correlations significant, at least, at the .01 level.

Breaking and entering with theft, including business and residential B & E, is highly and positively correlated with single-parent families and female heads of households, and negatively with home ownership, single-detached houses, family persons, and the population-police ratio. The rates of total B & E and business B & E are positively associated with

unemployment, young female single parents and heads of households, and the infant mortality rate, and negatively associated with the married population. Total B & Es and resident B & Es are positively related to divorced persons, non-family persons, and apartment dwellings. Business B & Es are, in addition, related positively to people who moved between 1971 and 1976, and people with less than a grade nine education; resident B & Es correlate positively with migrants from outside Canada and women in the labour force.

Table 6

Zero-Order Correlations
Total Breaking and Entering and Theft (BETHEFT)
with Socio-Demographic Variables

Positive		Negative	
LPFAMILY	.655	OWNED	-.583
LONEPARP	.651	HOUSESD	-.444
RENTED	.583	MARRIED	-.417
UNEMRATE	.499	FAMILY	-.416
NOWORK	.452	PPR	-.408
DIVORCED	.452		
NOFAMILY	.406		
DEADBABY	.405		
FEMHEADS	.396		
APARTMNT	.393		
YFEMLPAR	.362		
YFEMHEAD	.348		

All correlations significant, at least, at the .01 level.

Table 7

Zero-Order Correlations
Business Breaking and Entering and Theft (BUSINESS)
with Socio-Demographic Variables

Positive		Negative	
LONEPARP	.613	OWNED	-.526
LPFAMILY	.609	MARRIED	-.424
UNEMRATE	.568	HOUSESD	-.378
RENTED	.525	PPR	-.354
NOWORK	.520	FAMILY	-.343
YFEMLPAR	.450		
NPOSTSEC	.444		
DEADBABY	.427		
YFEMHEAD	.410		
POPLESS9	.407		
LABFORM9	.389		
LABFOR9	.353		
FEMHEADS	.351		
MOVERS	.347		

All correlations significant, at least, at the .01 level.

Table 8

Zero-Order Correlations
Residential Breaking and Entering and Theft (RESIDENT)
with Socio-Demographic Variables

Positive		Negative	
DIVORCED	.588	OWNED	-.554
LPFAMILY	.575	HOUSESD	-.462
LONEPARP	.567	FAMILY	-.448
RENTED	.554	PPR	-.398
APARTMNT	.496		
POP1976	.435		
NOFAMILY	.432		
FEMLABOR	.431		
FEMHEADS	.398		
SINGLE15	.383		
DENSITY	.374		
FROMOUT	.360		

All correlations significant, at least, at the .01 level.

Both theft over $200 and motor vehicle theft are related statistically to many of the same variables. Significant positive relationships exist between these crime rates and rented housing, apartments, single-parent families and persons in single-parent families, divorced and single persons, young female heads of households, women in the labour force, non-family persons, unemployment, and infant mortality. Significant negative relationships are to be found with home ownership, single-detached houses, the married population, and the population-police ratio.

Table 9

Zero-Order Correlations
Theft Over $200 (OVER) with Socio-Demographic Variables

Positive		Negative	
RENTED	.636	PPR	-.648
LPFAMILY	.583	OWNED	-.635
LONEPARP	.564	HOUSESD	-.600
YFEMHEAD	.515	MARRIED	-.579
FEMRATE	.510	FAMILY	-.400
APARTMNT	.490		
UNEMRATE	.489		
MFEMRATE	.481		
LFMARFEM	.480		
FEMLABOR	.470		
SINGLE15	.467		
DIVORCED	.435		
NOFAMILY	.433		
NOWORK	.369		
FAMILYNH	.348		
DEADBABY	.342		

All correlations significant, at least, at the .01 level.

Table 10

Zero-Order Correlations
Motor Vehicle Theft (VEHICLES)
with Socio-Demographic Variables

Positive		Negative	
RENTED	.611	OWNED	-.611
LPFAMILY	.555	HOUSESD	-.517
LONEPARP	.555	PPR	-.514
UNEMRATE	.538	MARRIED	-.494
APARTMNT	.457	FAMILY	-.414
NOFAMILY	.432		
YFEMHEAD	.426		
DIVORCED	.417		
SINGLE15	.400		
NOWORK	.399		
MFEMRATE	.368		
LFMARFEM	.366		
FEMLABOR	.363		
FEMRATE	.362		
DEADBABY	.354		

All correlations significant, at least, at the .01 level.

In this initial, correlational, step in our analysis, two variables, the percentage of homes owner-occupied (OWNDED) and the population-police ratio (PPR), are significantly related to all crime categories. The strong negative relationships confirm the findings of most previous ecological research. Ogburn (1935) is a rare exception in that he found no relationship between crime rates and home ownership. Virtually all studies that have considered the impact of police on crime rates have found that the more police per capita, the higher the rates (Pressman & Carol, 1971; Cho, 1972; C.O.M.P., 1973; Greenwood & Wadycki, 1973; Swimmer, 1974; Huff & Stahura, 1980).

The present analysis also has found that the proportion of the population in families (FAMILY) has a high, negative relationship to all crime rates, with the exception of the three assault categories. The proportion of families with a single parent (LPFAMILY) and the proportion of the population in single-parent families (LONEPARP) have strong, positive relationships to all crimes, except the most serious assaults. The married population (MARRIED) is associated negatively with all crimes, except residential B & E and motor vehicle theft. All this tends to confirm previous findings (See Ogburn, 1935; Schuessler, 1962; Schuessler & Slatin, 1964).

This study, too, has found a number of measures of low socio-economic status and/or poverty significantly related to crime rates. Unemployment (NOWORK), especially male unemployment

(UNEMRATE), and infant mortality (DEADBABY)[5] show positive associations with the assault categories, total B & Es with theft, business B & Es, theft over $200, and motor vehicle theft. Other possible indicators of low SES -- the proportion of single-parent families, young female single-parents, young female heads of households, persons with a relatively low level of education -- are positively related to rates of assault, B & E with theft, theft over $200, and possibly auto theft, robbery, and sex offences.

Both city size and population density have been linked, by previous research, to variations in crime rates. The results here, though, show population size (POP1976) and density (DENSITY) related significantly, and positively, to only three crime categories -- sex offences, robbery, and residential B & E. Population change (CHANGE) is associated, and inversely, only with rates of sex crimes. Population mobility (FROMOUT or MOVERS) is associated positively with rates of sex offences and robbery, as well as business and residential B & E.[6] Contrary to the findings of much previous research, variables indicating the proportion of young males (MALE1524 and YOUNGMEN), females (FEMALES), older people in the population (OVER54), and crowding (AVEPERHH, AVEPFAM, PRIVHH5) were not found here to be significantly related to any of the crime categories.

Crime Factors

Many ecological studies have obtained fairly clear-cut groupings of offences into property crimes and violent personal crimes. In this respect, the results of the present factor analysis on crime variables proved to be somewhat disappointing, since no clear separation occurred. In fact, no discernable pattern at all emerges in the two factors generated by the data.

Table 11 presents the results of an orthogonal rotation with a varimax solution. The assault categories, business B & E with theft, and motor vehicle theft load most heavily on Factor I, while sex offences, robbery, residential B & E with theft, and theft over $200 have the highest loadings on Factor II; motor vehicle theft and theft over $200 load fairly heavily on both factors. The mixture of personal and property crimes which constitutes each factor makes interpretation difficult.

Eberts and Schwirian (1968) have suggested that sex crimes, especially rape, may be more associated with less violent crimes because it is a crime of opportunity rather than one of intended personal violence. However, it could be argued that the crimes grouped here with sex offences -- robbery, residential breaking and entering, and theft -- are somewhat more "personal" than the crimes of business B & E and auto theft. The present findings would seem to support, at least as well, the interesting

Table 11

Crime Factors

Factor I		Factor II	
COMMON	.849	RESIDENT	.776
AGGRASS	.755	SEXCRIME	.750
BUSINESS	.717	ROBBERY	.728
VEHICLES	.616	OVER	.600
OVER*	.592	VEHICLES**	.585

*OVER loads highest on Factor II
**VEHICLES loads highest on Factor I

Factor	Eigen-Value	% of Variance	Cum %
Factor I	4.33981	82.7	82.7
Factor II	0.90819	17.3	100.0

claim by Clark and Lewis (1977) that rape is basically a crime of theft. Of course, the results are further confused by the fact that the "less personal offences" of business B & E and auto theft are grouped with assaults which are definitely personal in nature. Suffice it to say, the findings here do not confirm those generally found in U.S. studies.

Socio-Demographic Factors

Table 12 illustrates the results of the factor analysis carried out on the socio-demographic variables; again, an orthogonal-varimax method of rotation was used.

The variables which load on Factor 1 seem to represent attributes of modern urban centres. A city with a high factor score on Factor 1 would have: a relatively high population density; a low average number of persons per family and per household; a relative lack of home ownership and single-detached houses; a high proportion of apartment dwellings; a high proportion of the population which is divorced; a high proportion of non-family persons in private households; a high proportion of single-parent families and persons in single-parent families; a high proportion of households headed

Table 12

Socio-Demographic Factors

Factor 1 (Urbanism)		Factor 2 (Low Guard'ship)		Factor 3 (Stability)		Factor 4 (Low SES)	
NOFAMILY	.940	FEMRATE	.936	MIGRANTS	-.858	NPOSTSEC	.828
FEMHEADS	.937	MFEMRATE	.893	MOVERS	-.853	LABFOR9	.756
DIVORCED	.935	LFMARFEM	.892	CHANGE	-.796	POPLESS9	.722
APARTMNT	.912	MARRIED	-.783	KIDS1524	.753	YFEMLPAR	.689
AVEPERHH	-.907	SINGLE15	.724	SCHMALES	.720	NOWORK	.636
DENSITY	.862	OVER54*	-.659	KIDSU15	-.705	UNEMRATE	.587
AVEPFAM	-.847	YFEMHEAD	.642	YMENHSCH	.698		
OWNED	-.847	MALE1524	.596				
LABORFEM	.822						
WDLFFEM	.774						
KIDSO25	.774						
FEMALES	.765						
HOUSESD	-.728						
LONEPARP	.719						
MWOMRATE	.704						
OVER54	.667						
MYFRATE	.649						
LPFAMILY	.630						

*This variable loads highest on Factor 1.

Factor	Eigen-Value	% of Variance	Cum %
Factor 1	14.24405	48.2	48.2
Factor 2	7.55228	25.6	73.8
Factor 3	4.28240	14.5	88.2
Factor 4	3.47340	11.8	100.0

by women; a high proportion of the labour force which is female; a high proportion of widowed and divorced women in the labour force; a high participation rate for married women in the labour force; a high proportion of children in families 25 years of age and over; and a high proportion of the population which is 55 years of age and older. Since Factor 1 is made up of the above characteristics, we have named it URBANISM.[7]

The characteristics reflected in Factor 2 indicate what Cohen and Felson (1979) refer to as "the absence of capable guardians" from the home. This situation is indicated by such things as relatively large proportions of young, single persons including males between the ages of 15 and 24, working women, households headed by young women, and an absence of older people. Factor 2 as an inferred factor, is named LOW GUARDIANSHIP.

A pattern of population STABILITY is suggested by the variables which load on Factor 3. This stability is reflected by characteristics such as little or no change in population (growth or decline), relatively small numbers of migrants and people who moved during the five years 1971 to 1976, larger numbers of children in school, including males 15-24, and fewer young children under the age of 15 years.

Factor 4 reflects what we have chosen to call LOW SOCIO-ECONOMIC STATUS (SES). The variables loading on this factor include unemployment, particularly male unemployment, low

levels of educational achievement, and a relatively large proportion of young women who are single-parents.

Factor-Regression Models

Factor analysis allows one to see whether some underlying pattern of relationships exists among variables, but it does not explain the influence these factors exert on crime rates. That is, no such interpretations can be made solely from an examination of factor loadings. In order that judgments can be made regarding the influence of the socio-demographic factors, the factor scores of our four factors were regressed on the crime rates. An advantage of using factor scores as input in a regression analysis is that they are independent, and the correlations among the factors entered in the equation are zero.

The results of the stepwise "factor-regression" are presented in Tables 13 through 22. It is clear that Factor 1 (URBANISM) is the most influential factor in explaining the variance in inter-urban rates of sex crimes, accounting for 22% of the variance. Apparently, sex offences tend to occur with greater frequency in the more densely populated communities with their higher divorce rates, smaller families, greater numbers of apartment renters, non-family persons, single-parent families, female heads of households, and working women.

Table 13

Factor-Regression Model:Sex Offences

Dependent Variable:SEXCRIME

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 1	.223	.223	.472	.517	.017	20.611
Factor 2	.326	.103	.350	.287	.015	6.956
Factor 4	.375	.050	.239	.206	.015	3.677
Factor 3	.417	.042	.105	.220	.018	3.667

The second most important factor affecting sex offence rates is Factor 2 (LOW GUARDIANSHIP). This factor also represents elements of modern urban areas, namely relatively large numbers of young, single people, working women, households headed by young women, and fewer older people. Factor 4 (LOW SES) and Factor 3 (STABILITY) play less important roles. The four factors together explain only about 42% of the variance.

Assaults, the greater percentage of which are common assaults, are most affected by LOW SES. This means that the assault rate tends to be higher in communities whose populations are more poorly educated and experience higher rates of unemployment. The LOW GUARDIANSHIP factor would also seem to be

involved in explaining assault rates, but it obviously has considerably less impact. The most serious assaults (Table 16) appear to be related to, albeit mildly, a relative lack of population stability, indicating that offences such as wounding and assault causing bodily harm are more likely in places that have a more mobile and transient population.

Table 14

Factor-Regresssion Model: Total Assaults

Dependent Variable:ASSAULTS

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 4	.357	.357	.598	.597	.350	36.730
Factor 2	.485	.128	.359	.358	.349	13.214

Table 15

Factor-Regression Model:Common Assault

Dependent Variable:COMMON

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 4	.330	.330	.574	.574	.300	31.778
Factor 2	.451	.121	.348	.347	.299	11.644

Table 16

Factor-Regression Model:Serious Assaults

Dependent Variable:AGGRASS

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 4	.215	.215	.463	.478	.079	20.239
Factor 2	.359	.144	.380	.412	.079	14.771
Factor 3	.414	.056	-.152	-.239	.089	4.945

The URBANISM factor has the greatest impact on the robbery rate, with the STABILITY factor playing a much less important part. This would seem to indicate tht the more "urban" centres, experiencing at least a modicum of population stability, have the highest rates of robbery.

Table 17

Factor-Regression Model:Robbery

Dependent Variable:ROBBERY

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 1	.343	.343	.586	.671	.067	36.021
Factor 3	.406	.063	.048	.265	.071	5.608

Breaking and entering with theft is also most influenced by the URBANISM factor, with LOW SES making a less important contribution. LOW GUARDIANSHIP is the least important factor in explaining both residential and business B & E. But, whereas the elements of urbanism appear most important with regard to the rates of residential B & E, it is low socio-economic status that explains the greatest amount of variance in the rates of business B & E.

Table 18

Factor-Regression Model:Total B & E and Theft

Dependent Variable:BETHEFT

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 1	.201	.201	.449	.415	.706	15.404
Factor 4	.327	.126	.372	.356	.664	11.361
Factor 2	.421	.093	.333	.306	.662	8.350

Table 19

Factor-Regression Model:Business B & E and Theft

Dependent Variable:BUSINESS

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 4	.227	.227	.477	.462	.347	20.491
Factor 1	.386	.158	.415	.381	.369	13.843
Factor 2	.459	.073	.296	.271	.346	7.027

Table 20

Factor-Regression Model:Residential B & E and Theft

Dependent Variable:RESIDENT

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 1	.187	.187	.432	.413	.398	12.385
Factor 2	.272	.085	.319	.292	.373	6.181

LOW GUARDIANSHIP is most highly associated with the rates of theft over $200, with URBANISM and LOW SES following in importance. The three factors together explain nearly 58% of the variance. Motor vehicle theft is also influenced by the same three factors; however, in this case the most important factor is URBANISM, with LOW GUARDIANSHIP of secondary importance.

Table 21

Factor-Regression Model:Theft Over $200

Dependent Variable:OVER

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 2	.310	.310	.557	.529	.187	34.139
Factor 1	.500	.189	.470	.426	.199	22.077
Factor 4	.575	.076	.292	.276	.187	9.288

Table 22

Factor-Regression Model:Motor Vehicle Theft

Dependent Variable:VEHICLES

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
Factor 1	.206	.206	.454	.416	.301	16.789
Factor 2	.368	.162	.431	.404	.283	15.855
Factor 4	.467	.099	.331	.315	.283	9.653

Among our four factors URBANISM appears to be the most important in explaining the variance in crime rates among the province's municipalities. This factor has the greatest impact on sex offences, robbery, breaking and entering with theft, residential B & E, and auto theft. It is the second most important factor in explaining business B & E and theft over $200. In fact, the only crime rates unaffected by this factor are the assault categories. A look at the crime rates for the 56 municipalities in B.C. shows that some of the highest rates of assault are, indeed, to be found in the smaller, "less urban" communities.

Factor 4, LOW SES, is also very influential in explaining variations in crime rates. It assumes its greatest importance in explaining the rates of assault and business B & E. It has at least some association with the rates of all other crime rates, except that of robbery.

Factor 2, LOW GUARDIANSHIP, representing the lack of capable guardians at home, is another important factor in explaining crime rates. It is most important with regard to rates of theft over $200 and of secondary importance in explaining rates of sex crimes, assaults, residential B & Es, and motor vehicle theft. It is the third variable entered in the equation for total B & E with theft and business B & E with theft.

Factor 3, STABILITY, is the least important factor, being the last variable entered in the SEXCRIME, AGGRASS, and ROBBERY equations. It assumes its greatest importance in explaining just over 6% of the variation in robbery rates.

Regression Models

The results of the stepwise multiple regression analysis using selected socio-demographic (independent) variables are presented in Tables 23 through 32.

Five variables which meet the inclusion critera are included as predictors in the SEXCRIME model. Although LPFAMILY is the first variable entered, it has the least explanatory power when all the other variables are in the equation. An examination of the Betas indicates that migrants from outside Canada (FROMOUT) is the strongest predictor of sex crime rates; women with degrees (FEMDEG), divorced persons (DIVORCED), the population-police ratio (PPR), and single-parent families (LPFAMILY) follow in order of importance.[8] However, the five variables together account for only 56% of the explained variance, indicating that there are additional variables not measured in this analysis that affect the rate of sex offences. The low incidence of reported sex offences makes the SEXCRIME model perhaps of limited value; nevertheless, the model does suggest that municipalities in B.C. with proportionately more migrants, fewer women with university degrees, a higher divorce

rate, more single-parent families, and more police per capita have higher rates of sex offences.

Table 23

Regression Model: Sex Offences

Dependent Variable:SEXCRIME

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
LPFAMILY	.342	.342	.584	.161	.009	1.111
FROMOUT	.431	.089	.409	.337	.003	7.754
FEMDEG	.475	.044	-.023	-.322	.009	7.660
PPR	.523	.047	-.557	-.272	.000	5.219
DIVORCED	.555	.032	.579	.282	.030	3.583

There is a full compliment of seven variables entered as predictors in the ASSAULTS model, explaining nearly 72% of the variance. Higher assault rates are associated with relatively fewer young males living at home and attending school full time, a higher male unemployment rate, a greater proportion of households with more than five persons, a greater proportion of persons in single-parent families, little or no population change between 1971 and 1976, more police per capita, and a smaller population size.

Table 24

Regression Model:Total Assaults

Dependent Variable:ASSAULTS

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
UNEMRATE	.301	.301	.549	.340	.156	16.040
YMENHSCH	.481	.180	-.505	-.377	.098	12.045
CHANGE	.599	.117	-.158	-.224	.014	5.097
PPR	.641	.042	-.456	-.220	.002	5.294
PRIVHH5	.670	.028	.340	.300	.175	8.146
POP1976	.693	.024	-.087	-.166	.000	4.248
LONEPARP	.717	.024	.376	.234	.193	4.117

The common assault model also contains seven variables, but only three -- the population-police ratio (PPR), percent population change (CHANGE), the male unemployment rate (UNEMRATE) -- are also predictors of total assaults. But in both models the strongest predictor reflects the influence of children in their teens and older who live at home; the more there are, the lower the assault rate.

Table 25

Regression Model:Common Assault

Dependent Variable:COMMON

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
LABFORM9	.261	.261	.511	.241	.069	6.118
PPR	.492	.231	-.446	-.213	.002	3.568
FAMKID18	.559	.067	-.334	-.494	.063	19.070
UNEMRATE	.614	.055	.509	.202	.139	4.932
FROMPROV	.637	.024	-.327	-.213	.029	6.505
CHANGE	.663	.025	-.172	-.266	.012	6.386
OWNED	.698	.036	-.345	-.282	.031	5.673

Looking at the AGGRASS model, representing the most serious assaults, we find something peculiar. Of the five variables entered, FEMDEG assumes the position of strongest predictor when the other four variables are controlled for, and its relationship to the crime rate is positive. However, the sign of the zero-order correlation coefficient indicates an inverse relationship.[9] It would appear that this finding is counter-intuitive. We would expect a higher crime rate to be associated with fewer women with degrees, not more. The influence of the other variables in the model is in the expected direction.

Table 26

Regression Model: Serious Assaults

Dependent Variable:AGGRASS

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
UNEMRATE	.281	.281	.530	.378	.040	12.827
YMENHSCH	.398	.117	-.421	-.442	.022	13.909
FEMDEG	.473	.074	-.092	.459	.054	12.415
LABFORM9	.538	.065	.419	.365	.022	8.574
OWNED	.571	.033	-.370	-.199	.007	3.861

ROBBERY provides the best predictive model, with five variables accounting for 83% of the explained variance. Population size is easily the most important contributor. In addition to a larger population, the model shows that a smaller percentage of persons in families, more males in the labour force with less than a grade nine education, more persons in single-parent families, and more police per capita do a good job in predicting higher robbery rates.

Table 27

Regression Model:Robbery

Dependent Variable:ROBBERY

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
POP1976	.552	.552	.743	.579	.000	85.517
FAMILY	.756	.203	-.675	-.321	.009	16.142
LABFORM9	.788	.033	.092	.174	.008	8.699
PPR	.818	.030	-.536	-.155	.000	4.670
LONEPARP	.830	.012	.557	.152	.021	3.553

The rate of breaking and entering is related to, according to the model presented in Table 28, single-parent families, full-time students, and the unemployment rate. The models for business B & E and residential B & E present somewhat different pictures. The BUSINESS model explains 73% of the variance in crime rates among B.C. municipalities. Higher rates are predicted by proportionately more persons in single-parent families, fewer widowed and divorced women in the labour force, higher unemployment, fewer full-time students, a greater percentage of females in the population, and a lower population density. Once again we have counter-intuitive findings, this time with regard to widowed and divorced women in the labour force (WDLFFEM) and population density (DENSITY).

Table 28

Regression Model:Total B & E and Theft

Dependent Variable:BETHEFT

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
LPFAMILY	.429	.429	.655	.641	.255	48.498
ATSCHOOL	.555	.126	-.260	-.298	.437	10.635
NOWORK	.602	.047	.452	.232	.319	6.185

Table 29

Regression Model:Business B & E and Theft

Dependent Variable:BUSINESS

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
LONEPARP	.376	.376	.613	.855	.172	63.322
NOWORK	.530	.154	.520	.304	.151	13.822
WDLFFEM	.622	.091	.101	-.429	.175	10.253
ATSCHOOL	.686	.065	-.317	-.287	.205	13.081
FEMALES	.706	.020	.137	.283	.241	5.600
DENSITY	.727	.021	.184	-.229	.000	3.773

The problem of counter-intuitive results is found also in the RESIDENT model, which indicates that a larger proportion of households with more than five persons, together with a higher divorce rate, is associated with higher rates of residential B & E. With just two variables accounting for a mere 46% of the explained variance in the rates of the most prevalent type of B & E, this model is arguably the least satisfactory in the present analysis.

Table 30

Regression Model:Residential B & E and Theft

Dependent Variable:RESIDENT

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
DIVORCED	.345	.345	.588	.984	.703	40.618
PRIVHH5	.462	.116	-.223	.523	.231	11.473

The model for theft over $200 (Table 31) includes six variables, all positively related to the crime rate, the most powerful predictor being the population-police ratio.[10]

Four predictors are included in the model for motor vehicle theft. A relative lack of home ownership, larger households, higher male unemployment, and a greater proportion of female single-parents together explain about 60% of the variance in auto theft rates. Note again the difference in sign between the R and the Beta for the average number of persons per household (AVEPERHH).

Table 31

Regression Model:Theft Over $200

Dependent Variable:OVER

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
PPR	.420	.420	-.648	-.367	.001	15.023
MOVERS	.531	.110	.322	.301	.022	13.948
LPFAMILY	.618	.087	.583	.336	.092	11.051
ML9RATE	.653	.036	.175	.194	.014	5.548
POP1976	.684	.031	.304	.181	.000	5.008
UNEMRATE	.713	.029	.489	.190	.092	4.905

Table 32

Regression Model:Motor Vehicle Theft

Dependent Variable:VEHICLES

Independ. Variables	R^2	R^2 Change	R	Beta	Standard Error B	F
OWNED	.374	.374	-.611	-.766	.031	38.326
UNEMRATE	.496	.123	.538	.305	.139	10.001
AVEPERHH	.565	.068	-.174	.504	1.101	13.627
LONEPARF	.603	.038	.241	.243	.055	4.924

An examination of residuals[11] shows that for each of the regression equations there is at least one outlier.[12] The explanation for these outlying cases is that some or all of the socio-demographic characteristics included in a particular model, which predicts the crime rate for 56 municipalities, simply do not follow the same pattern for one or two of these municipalities.

An example of this is the SEXCRIME model which underpredicts the rate of sex offences for the city of Terrace. This is one of the smaller communities in the province (pop.10,251), but its sex crime rate is second only to Vancouver's (pop.410,188). The proportion of migrants is not particularly high, the divorce rate is one of the lowest in the

province, the proportion of single-parent families is not particularly high, and the number of police per capita is somewhat lower than might be expected from looking at the realtively high crime rate. Clearly, something different is happening in Terrace with regard to the characteristics that are associated with its rate of sex offences.

The community which appears most often as an outlier in the analysis is the small town of Williams Lake (pop. 6,199). It is an outlier in the ASSAULTS, COMMON, AGGRASS, and VEHICLES models. Obviously, the present analysis does not do a good job in predicting the very high rates of assault and auto theft in Williams Lake; population attributes contributing substantially to these crime rates are not measured in this analysis. The same could be said for Terrace and sex offence rates, as well as for Merritt and common assault, Prince Rupert and "aggravated" assault, Chilliwack and New Westminster and robbery, Kimberly and B & E, Langley and business B & E, Surrey and residential B & E and auto theft, and Comox and New Westminster and theft.

Discussion

Comparisons

As the foregoing analyses indicate, the two sets of regression models present somewhat different, but not

necessarily contradictory, pictures. At least part of the reason for this is the fact that the variable sets for the analyses are not identical. Variables which did not load sufficiently highly on any factor in initial runs were dropped from the final factor analysis of socio-demographic characteristics; and some variables in the regression analysis were included because of their supposed significant contribution to the explanation of crime rates in previous research, in spite of the fact that they may not have been very highly correlated with the crime categories used in the present study.

A direct comparison of the results of the two regression analyses is difficult, but perhaps something can be said in this regard. For one thing, it is clear that in virtually every instance, the goodness of fit (R^2) of the models using single independent variables is superior to that of the models based on the contributions of the four factors. It is also evident that elements of the factors which contribute to the prediction of crime rates in the first set of regresssion models are present in the second set of models.

The "factor-regression" indicates that the factor we have chosen to call URBANISM is important in explaining variation in the rates of sex offences and robbery among the municipalities of British Columbia; it is not, however, an important factor in explaining assault rates, where LOW SOCIO-ECONOMIC STATUS assumes predominance. The STABILITY factor has a relatively

minor impact, and then only on the rates of sex offences, the more serious assaults, and robbery.

These findings are, at least partially, supported by the results of the second regression analysis. Aspects of "urbanism" (as represented by variables such as POP1976, FAMILY, LPFAMILY, DIVORCED, LONEPARP) are present to some degree as predictors of sex offence rates and robbery rates. Indicators of "low socio-economic status" (UNEMRATE, LONEPARP, LABFORM9, OWNED) are present in the models predicting assault rates. These models also show that higher robbery rates tend to be experienced in the larger urban areas, while higher assault rates are more likely in the smaller communities in the province.

The URBANISM factor is again important in explaining the crimes involving theft; LOW GUARDIANSHIP and LOW SES also influence these offence rates. The results of the second regression analysis do not contradict these findings. Elements of "urbanism" (POP1976, OWNED, FEMALES, DIVORCED, LPFAMILY, LONEPARP, LONEPARF) are present in the predictive models for B & E with theft, theft over $200, and motor vehicle theft. Indicators of a lack of "guardians" at home are not in evidence in these models, but elements of "LOW SES" (NOWORK, UNEMRATE, LPFAMILY, LONEPARP, LONEPARF, ML9RATE, OWNED) certainly are.

A few of the findings of the second regression analysis are what we have termed counter-intuitive, or contrary to what one would expect. For instance, lower population density (DENSITY)

is associated with higher rates of business B & E; and larger households (AVEPERHH and PRIVHH5) are associated with higher rates of residential B & E and motor vehicle theft. A good explanation for these unexpected results is not readily apparent.

Many previous ecology of crime studies have used factor analysis in their investigations of crime patterns. The inappropriateness of factoring crime categories and socio-demographic variables together, which has been done by certain researchers (Lander, 1954; Schmid, 1960; Schuessler, 1962; Schuessler & Slatin, 1964; Harries, 1976a, to name a few), has been pointed out earlier, in Chapter 3. When crime rates are factored separately, it is often found that crimes tend to cluster into two types: crimes against property and crimes against persons.

There are, however, at least two inter-urban studies which did not obtain this neat separation of criminal offences. Eberts & Schwirian (1968) and Harries (1974) both came up with a "general" crime factor and a violent crime factor. The general crime grouping, in both cases, included rape, robbery, burglary, larceny, and auto theft; the second factor consisted of murder and assault.

Although the crime factors of the present study are somewhat closer in their make-up to those of Eberts & Schwirian and Harries than to those of a number of other studies, no clear

pattern emerges. One factor does show high loadings for sex offences, robbery, residential B & E, theft over $200, and motor vehicle theft. On the other hand, the second factor has high loadings for common assault, the more serious assaults, business B & E, as well as motor vehicle theft and theft over $200. It should be pointed out that the three variables SEXCRIME, ROBBERY, and RESIDENT, which are grouped together in one factor, are strongly correlated with virtually the same socio-demographic variables.

A sizable slice of the ecology of crime literature has been concerned with the relationship between two factors -- "urbanism" (or "urbanization") and "poverty" -- and crime rates and crime rate trends. Urbanism (Wirth, 1938; Pressman & Carol, 1971; Flango & Sherbenou, 1976; Nettler, 1978) and poverty (C.O.M.P., 1973; Harries, 1976b; Flango & Sherbenou, 1976; Nettler, 1978) continue to be major concerns in the search for explanations of crime and delinquency.

An interesting comparison can be made between the findings of the "factor-regression" in the present study and those of Flango & Sherbenou (1976). Flango & Sherbenou found that their "urbanization" factor was most important in explaining variations in rates of robbery and auto theft, for both large and small cities; it was also an important factor in explaining burglary rates. A similar finding emerged from the present analysis, in that our URBANISM factor has its strongest

association with robbery and motor vehicle theft, as well as with B & E with theft.[13]

Flango & Sherbenou's "poverty" factor was of primary importance in explaining aggravated assault and burglary rates, for both large and small cities. In the present study, it is LOW SES which explains the greatest amount of variance in all three assault categories and in business B & E rates; it is second in importance in explaining the rates of total B & E with theft.

The literature has considered the impact of certain single socio-demographic variables on crime rates. Some of the more important of these predictors of crime rate variations with particular reference to inter-urban studies, include population size (Ogburn, 1935; Wolfgang, 1968; C.O.M.P, 1973; Haynes, 1973; Harries, 1974; Braithwaite, 1975; Booth, et al., 1976; Skogan, 1976; Nettler, 1978), population density (Pressman & Carol, 1971; C.O.M.P., 1973; Spector, 1975; McCarthy, et al., 1975; Booth, et al., 1976; Skogan, 1976; Danziger, 1976; Nettler, 1978), crowding (Galle, et al., 1972; Carnahan, et al., 1974; Fischer & Baldassare, 1975; Booth, et al., 1976; Nettler, 1978), young males 15-24 years of age (Harries, 1974; Nettler, 1978; Cohen & Felson, 1979), women in the labour force (Glaser & Rice, 1959; Cohen & Felson, 1979; Harris, 1981), single-parent families, female single-parents, and female heads of households (Cohen & Felson, 1979), unemployment (Glaser & Rice, 1959; Guttentag, 1968; Swimmer, 1974; Spector, 1975; Danziger, 1976;

Cohen & Felson, 1979), home ownership (Ogburn, 1935; Lander, 1954; Schmid, 1960, Schuessler, 1962; Schuessler & Slatin, 1964), and the number of police per capita (C.O.M.P., 1973; Greenwood & Wadycki, 1973; Swimmer, 1974; Chapman, 1976; Huff & Stahura, 1980).

The findings of this study indicate that population size makes a contribution to the prediction of total assault rates, robbery, and theft. In the case of assaults, however, the relationship is inverse, which is contrary to almost all U.S. findings.

Density does not figure prominently in the regression models here. It is a predictor only of business B & E, and a comparatively weak one at that, being the sixth and last variable entered in the equation. The interesting thing about this is that the unique contribution of this variable is in a negative direction, when the percentage of persons in single-parent families, unemployment, widowed and divorced women in the labour force, persons attending school full-time, and the proportion of females are controlled for.[14]

This study has not included any direct measure of household crowding; the closest approximations to such a measure is the percentage of households with more than five persons (PRIVHH5), which is positively related to the rates of total assaults and residential B & E, and the average number of persons per household (AVEPERHH), which has a positive relationship to the

rate of motor vehicle theft.

The proportion of young males 15-24 in the population has often been considered a good predictor of crime rates. However, in the present study this variable (MALE1524 or YOUNGMEN) does not have a significant zero-order correlation with any of the crime categories, nor does it appear as a predictor of crime rates in any of the regression models.

The proportion of women in the labour force does not figure as a predictor in any of the regression models, except for the negative relationship of widowed and divorced working women to business B & E, although the various indicators of women in the labour force have significant zero-order correlations to sex offences, robbery, residential B & E, theft over $200, and motor vehicle theft, and are prominent elements in Factor 1 and Factor 2 which contribute to the explanations of all the rates of crime used in this study.

Single-parent families (LPFAMILY) is a predictor in the models for sex offences, B & E with theft, and theft over $200; persons in single-parent families (LONEPARP) helps predict total assaults, robbery, and business B & E; female single-parents (LONEPARF) is a predictor in the motor vehicle theft model.

Unemployment (NOWORK) is a predictor of total B & E and business B & E; male unemployment (UNEMRATE) is a predictor of each of the assault categories, theft over $200, and motor vehicle theft.

Tenure, or home ownership, has been found, largely in intra-urban studies, to be a good predictor of crime rates. In these studies a greater proportion of homes owner-occupied has almost always been related to lower crime rates. The present findings show home ownership (OWNED) negatively related in the models predicting common assault, "aggravated" assault, and auto theft. As indicated earlier in this paper, the zero-order correlations show this variable significantly related to every crime rate used in the study.

The population-police ratio (PPR) in the present study appears to be a relatively good predictor of crime rates. Larger numbers of police per capita predict higher rates of sex offences, assaults, robbery, and theft. The zero-order correlations, reported earlier, indicate that PPR is significantly and negatively related to all crime categories.

Explanations

The present study is not particularly concerned with "explaining" the differential distribution of crime rates among B.C.'s urban areas, either through one of the existing theories of crime or by developing one of its own. It is primarily an exercise in discovery, not one of explanation. Nevertheless, "explaining" crime rates is a major concern of criminology. When ecological studies are concerned with theory it is usually to confirm one or another of the "traditional" explanations of

crime and delinquency.

Prominent among these "traditional" theories of crime is that of social disorganization, introduced by Shaw and McKay as an explanation of intra-urban variations in delinquency rates. The observation that delinquency rates seemed to vary along with a number of other social problems prompted Shaw and McKay to hypothesize that differences in rates of delinquency among the areas within cities is a function of the differences in the degree of social organization of various (ethnic) groups.

Social disorganization, defined as "the disintegration of the community as the basis of social control", is linked to Edwin Sutherland's notion of differential association (Shaw & McKay's version of which is referred to as cultural transmission) (Vold, 1979:236). In areas with rapid industrialization, poor housing, overcrowding, a low standard of living, and a transient population, traditional forms of social control break down, and delinquent values and goals are transmitted from individual to individual, group to group, and from generation to generation. In this way the delinquent "subculture" is nurtured and passed on.

Another established explanation of the differential distribution of crime rates, with themes similar to those of social disorganization, is anomie. Originally conceived by Emile Durkheim, anomie refers to a condition of normlessness, or a relative absence of social regulation, which occurs when an

individual's "natural" desires are no logner curbed or controlled by society. Robert Merton's reformulation of the concept suggests that the needs and desires of individuals are "culturally induced". Social structural pressures are exerted differentially on the various groups in society; the social structure exerts pressure on certain individuals and groups to engage in non-conformist, or criminal behaviour in order to attain the goals that the culture has defined as "worth striving for", because they are denied access to legitimate means of achieving those goals. This explains "why crime is more concentrated in some groups than in others" (Vold, 1979:211-212).

The differential distribution of crime rates has been linked also to inter-group, or culture conflict. Subsumed under this heading are the subcultural theories of crime and delinquency. It may seem misleading to discuss "conflict" and "subcultures" as something separate and distinct from the explanations already mentioned above, since the ideas of conflict and subcultures are implicit in their formulation; in fact, all explanations of the differential distribution of crime and delinquency involve the idea of conflict, either explicitly or implicitly. Here, we will distinguish between the conflict generated in society by blocked opportunity as in the anomie and social disorganization theories, and the conflict which results from a "collision" of different cultures in society.

Subcultural theories are based on the belief that some groups in society do not share the norms and values of the dominant, or majority, culture. Two main focal concerns of the culture conflict perspective are (1) the activities of delinquent gangs and (2) the lifestyle of minority cultures, as in Wolfgang and Ferracuti's "subculture-of-violence" theory. Crime and delinquency are generated as a consequence of the conflicting norms and values between the dominant and subordinate groups in society.

A major problem with virtually all of the explanations so far discussed is that they tend to be tautological; conditions of social disorganization, or anomie, or subcultural violence are indicated by high rates of crime and delinquency. That is to say, one is able to recognize such a condition within an area or a social group largely because of the high crime rates within that area or group. Part of what is to be explained -- crime rates -- is itself part of the explanation.

Another question with regard to theories such as anomie or social disorganization that is not addressed by these theories, is this: If areas vary with respect to their crime rates relative to the variation of other social problems, or to the degree of social disorganization or anomie, why does this differential exist? Why does an area have a greater degree of social disorganization or anomie than another area?

These traditional explanations of crime rate variation have been used more in intra-urban than in inter-urban studies. Indeed, these theories do not address themselves very well to the question of inter-urban crime patterns; the kind of "conflict" implied in the theories of social disorganization and anomie, and the culture conflict explicit in the subcultural theories seem more useful in accounting for variations in crime rates among the areas within a city than they do in accounting for variations among different cities.

There are other established theories of crime rate variation that are perhaps more useful in explaining differences among cities. The idea that economic conditions are determinants of crime rates is probably "the oldest and most elaborately documented" of these (Vold, 1979:161). The basic premise is that economic pressures are differentially experienced among various social groups or classes. Measures of poverty and affluence, income inequality, unemployment, and socio-economic status are used to indicate such conditions as economic insecurity, frustration, and relative deprivation.

A major theme in much American sociology and criminology, and an explanation of long standing, is that which attributes the bulk of crime to conditions that are peculiar to urban areas. As A.E. Bottoms has stated, "[c]rime is largely an urban phenomenon..." (Baldwin & Bottoms, 1976:1). Urban life, according to Wolfgang (1968), is characterized by relatively

high population densities, spatial mobility, ethnic and class heterogeneity, reduced family functions, and greater anonymity. Because urban living is more anonymous, more impersonalized, community restraints are lessened and there is more opportunity to deviate. There are also more opportunities for crime in the city because of the concentration of people, goods and services, and business establishments.

One of the more recent attempts to explain the variation in inter-urban crime rates and one of the most interesting, is that of Cohen & Felson (1979) who have concentrated on social patterns which may create more opportunities for crime. These social patterns and work patterns are indicated by such things as the number of women in the labour force, especially married women; the number of single-parent families and female heads of households; the number of young, single persons; and the number of persons in school, adults as well as children. All this tends to create an absence of people, or as Cohen & Felson put it, an "absence of capable guardians", at home during the day and night. These authors suggest that rising crime rates are inextricably linked with our present way of life.

> It is ironic that the very factors which increase the opportunity to enjoy the benefits of life also may increase the opportunity for predatory violations. For example, authomobiles provide freedom of movement to offenders as well as average citizens and offer valuable targets for theft. College enrollment, female labor force participation, urbanization, suburbanization, vacations and new electronic durables provide various opportunities to escape the confines of the household

while they increase the risk of predatory victimization... Rather than assuming that predatory crime is simply an indication of social breakdown, one might take it as a byproduct of freedom and prosperity as they manifest themselves in the routine activities of everyday life (Cohen & Felson, 1979:605).

Notes

1. See Chapter 3, p. 71.

2. The SPSS subprogram REGRESSION has a limitation in that only forward (stepwise) inclusion is provided. There is no backward elimination of predictors from a regression equation, nor forward inclusion combined with deletion of variables no longer meeting the pre-established criterion at each successive step. (See SPSS manual, 2d ed., 1975:345).

3. All the correlations between crime rates and socio-demographic variables are included in Table D of the Appendix.

4. The negative sign on the population/police coefficient indicates a positive correlation between the number of police personnel per capita and the crime rate.

5. The infant mortality rate is often considered an indicator of poverty and the accompanying lack of facilities and access to health and social services.

6. These correlations confirm, to a large extent, the findings of a number of intra-urban research studies as well (see Chapter 2): Higher crime rates associated with such population characteristics as infant mortality, single and unemployed males, poverty, low socio-economic status, greater population mobility, fewer owner-occupied homes and single-family dwellings, and more women in the labour force.

7. It must be understood that a factor is only a construct; it has no reality per se. In ecology of crime studies it is common for researchers to name the factors generated by the analysis, but naming factors does not give them reality. "Factor names are simply attempts to epitomize the essence of factors. They are always tentative, subject to later confirmation or disconfirmation" (Kerlinger, 1973:688).

8. The Beta indicates the unique contribution of an independent variable, when the other variables in the regression model are taken into account; that is, the Beta shows the strength and

direction of a particular variable's predictive power, controlling for the other variables in the model.

9. The difference in sign between the zero-order correlation (R) and the partial correlation (Beta) is the result of multicollinearity amongst the variables in the model.

10. See note 4, where the negative sign on PPR is explained.

11. Residuals are the differences between what is actually observed (i.e., the data) and what is predicted by the regression equation; that is, the amount which the regression equation has not been able to explain. If the model is correct, residuals = the observed errors.

12. Outliers are the cases in the regression analysis which represent a substantial difference between the observed crime rate and the predicted crime rate. In the present study, an outlier is any case whose residual lies outside two standard deviations from the mean.

Outliers are often ignored by researchers, or are dropped. However, Draper & Smith (1966:95) contend that "[a]s a general rule, outliers should be rejected out of hand only if they can be traced to causes such as errors in recording the observations...".

13. Of course, the "urbanization" factor of Flango & Sherbenou (1976) and the "urbanism" factor of the present study are not composed of identical characteristics; the Flango & Sherbenou "urbanization" factor is made up of high density, foreign-born residents, apartment renters, and mass transit users. The "poverty" factor in the same study consists of a large proportion of blacks, families headed by females, low income, low levels of education, overcrowded and substandard housing.

14. In this context it is interesting to note a finding of Kvalseth (1977) who reported that "any relationship between population density and crime, if significant at all, is a negative one" (p.109).

VI. Conclusion

The foregoing discussion of explanations of crime suggests that finding an adequate explanation of crime rate variation is somewhat problematic, particularly if it involves the concept of causation. Much effort has been expended in criminology to discover the "causes of crime". Ecological studies of crime and delinquency have played a major role in this research for causes. But causal explanations in ecology of crime research must be inferred from statistical correlations between crime rates and demographic, social and economic characteristics.

Causal explanations are only one form of explanation in social science. Richard Quinney (1970) has made the suggestion that it might be more appropriate in criminology to think in terms of "contributory conditions" rather than causes.

> A contributory condition is one that increases the likelihood that a given phenomenon will occur but does not make it certain because it is only one of a number of factors that together determine the occurrence of the phenomenon (Quinney, 1970:128).

In ecological research we speak of determinants or predictors of crime; but by this we should mean probable facilitating factors or conditions rather than causes.

Quinney believes that "...there is no definite way at arriving at conclusions about the social world, the causation of events, or anything else" (1970:144). Relationships among social

factors are too complex for us to isolate "causes". Nevertheless, we do attempt to come to conclusions, regardless of how tentative they may be.

The present study was an attempt to analyze some of the ecological correlates of crime in urban areas, the demographic, social and economic attributes that vary in relation to the distribution of crime rates among British Columbia's urban communities. Multivariate statistical analyses were used to discover which population characteristics seemed to "predict" the distribution of crime rates.

The first step in the analysis was the calculation of zero-order correlations between crime rates and various socio-demographic variables. For this purpose the Pearson product-moment correlation coefficient was used, which is appropriate when dealing with pairs of interval-level variables such as those used in this study.

The second step involved a factor analysis of the variables, or more precisely, two factor analyses -- one of the crime categories and one of the socio-demographic variables. The factor analyses were carried out, not only to see how the variables clustered together, as was the aim in factoring the crime rates, but also to obtain factor scores which could be used as independent variables in a multiple regression analysis, which was the primary purpose in factoring the socio-demographic variables.

As a last step, two stepwise regression analyses were performed: the regression of crime rates on factor scores, and the regression of crime rates on socio-demographic variables. The regression of crime rates using factor scores as independent variables, referred to in the study as a "factor-regression", yielded somewhat different, but not contradictory, results from the multiple regression analysis using selected, single, socio-demographic variables.

This is a good place to consider this study's findings with regard to the hypotheses stated and questions asked in Chapter IV. The hypotheses were based on the findings of both intra-urban and inter-urban research, the majority of which has been done in the United States. It was hypothesized that higher crime rates are associated with:

1. Greater size and density of the urban population. The present study found greater size and density associated principally with higher rates of sex offences, robbery, and residential breaking & entering; greater city size was related most strongly to robbery rates; however, smaller city size was related to higher rates of assault.
2. Greater cultural, or ethnic, heterogeneity. This was not adequately measured in this study; the MINORITY variable was not found to be significantly related to any crime category.
3. More rapid growth, or a declining population. The closest aproximation to such a measure was the percent change in

population from 1971 to 1976 (CHANGE); the zero-order correlations show this variable significantly related, inversely, only to the rate of sex offences; the regression analyses showed this variable to have some value in predicting common assault rates.

4. A greater proportion of young, single males. The best measure of this population attribute was the percentage of the population composed of males 15-24 years of age; it was not significantly related to any of the crime categories used in this study.

5. A higher rate of male unemployment. This variable (UNEMRATE) was significantly, and positively, related to all three assault categories, total B & E, businss B & E, theft over $200, and motor vehicle theft; the regression analyses indicated that male unemployment was a predictor of the rates of total assaults, common assault, the most serious assaults, theft over $200, and motor vehicle theft, and that the total unemployment rate was a predictor of total B & E and business B & E rates.

6. A greater proportion of people with low socio-economic status. The results of the regression analyses indicated that low SES helped predict the rates of sex offences, total B & E, business B & E, theft over $200, and motor vehicle theft, and was the most powerful indicator of all three assault rates.

7. Greater population mobility. The findings concerning mobility were inconclusive. The zero-order correlations revealed migrants from other countries (FROMOUT) positively related to rates of sex offences, robbery, and residential B & E, and the percentage of the population which had moved between 1971 and 1976 (MOVERS) positively related to the business B & E rate; the regression models showed more migrants (proportionately) from outside Canada contributing to the prediction of higher sex offence rates and more migrants from other Canadian provinces predicting higher rates of theft; the factor-regression analysis suggests that greater population mobility may contribute to the prediction of higher rates of the most serious assaults, and lower rates of sex offences and robbery.

8. A greater number of police per capita. This attribute, as measured by the population-police ratio (PPR), turned out to be one of the best predictors of inter-urban crime rates. It had a strong positive zero-order correlation with every crime category; and it was a predictor in the regression models for sex offences, total assaults, common assaults, robbery, and theft over $200.

9. A smaller degree of home ownership. The findings of the zero-order correlations showed a lower proportion of owner-occupied dwellings associated strongly with all crime categories; it also was included as a predictor of the rates

of common assault, the most serious assaults, and motor vehicle theft.

10. A lower proportion of the population 55 years and over. This study did not find this variable (OVER54) significantly related to any of the crime categories.

11. A greater proportion of women in the labour force. It was found that various indicators of women in the work force (FEMLABOR, LABORFEM, FEMRATE, WDLFFEM, LFMARFEM, MWOMRATE, MYRATE, FEMRATE) were positively and significantly correlated with rates of sex offences, robbery, residential B & E, theft over $200, and motor vehicle theft; these same variables were important elements of Factor 1 and Factor 2 which explained a part of the variation of every crime rate, with the least impact on assault rates.

It must be concluded that our hypotheses are only partially confirmed by the present findings. The best support was found for the hypotheses relating higher male unemployment, low socio-economic status, more police per capita, less home ownership, and more women in the labour force to higher crime rates. A major finding of previous ecological research, that higher crime rates are experienced in the larger, more densely populated urban centres, however, was not confirmed by the present findings. Only robbery was clearly associated with city size and density. On the other hand, assault tended to have a higher reported rate of occurrence in the smaller communities of

the province.

The doubtful value of urban size as a predictor of crime rate variation is illustrated by examination of high and low crime rates for the 56 municipalities:

Sex offences -- the highest rates occur in Vancouver (410,188), Terrace (10,251), and Chilliwack (8,634); the lowest rates occur in MacKenzie (5,338), Summerland (6,724), and Oak Bay (17,658).

Assaults -- highest rates in Merritt (5,680), Williams Lake (6,199), and Quesnel (7,637); lowest rates in Oak Bay (17,658), Comox (5,359), and West Vancouver (37,393).

Robbery -- highest rates in Vancouver (410,188), New Westminster (38,393), and Victoria (62,551); lowest rates in Comox (5,359), Kimberly (7,111), and Oak Bay (17,658).

B & E with theft -- highest rates in Campbell River (12,072), Langley (10,123), and Quesnel (7,636); lowest rates in MacKenzie (5,338), Sidney (6,732), and Kimberly (7,111).

Theft over $200 -- highest rates in New Westminster (38,393), Williams Lake (6,199), and Vancouver (410,188); lowest rates in Trail (9,976), Comox (5,359), and Kimberly (7,111).

Motor Vehicle theft -- highest rates in Williams Lake (6,199), New Westminster (38,393), and Fort St. John (8,947); lowest rates in Oak Bay (17,658), Summerland (6,724), and Kimberly (7,111).

We can conclude from these findings that inter-urban crime patterns in the Province of British Columbia do not necessarily parallel those reported in U.S. studies. Assumptions about crime

patterns in this country should not be based on U.S. research findings. It is also clear that generalizations regarding crime patterns in large urban centres will not necessarily hold for smaller, "less urban" communities. In addition, the present findings appear to indicate that the patterns for violent personal crimes differ to some extent from those for property offences. The distinction between property and personal crime is, however, not entirely clear. For one thing, factoring the crime categories did not yield a neat clustering of personal crimes as opposed to property crimes. And, the other parts of the analysis showed that many of the same socio-demographic characteristics which were associated with the personal offences were also associated with the property offences.

It is likely that the present findings can be interpreted in a variety of ways. However, it would seem to this writer that crime rate variations may best be "explained" by a combination of two general factors which may be called, for lack of better terms, "urbanism" and "economic pressures". It is tempting to include "opportunity" as a third explanatory factor, the sort of opportunity created by the "routine activity patterns" delineated by Cohen and Felson (1979). But the findings here do not indicate at all clearly that higher crime rates are a consequence of social patterns that are likely to result in an absence of "guardians" at home (i.e., a high proportion of working women). If this were the case, we should see it

reflected in the models for residential breaking and entering with theft. In fact, we do not see this. The RESIDENT factor-regression model did show that Factor 2 (LOW GUARDIANSHIP) contributed to variations in the rate of residential B & E, but neither the second regression model nor the zero-order correlates of residential B & E indicated that an absence of persons from the home was associated with higher rates of B & E. This was true also for the other criminal offence models.

The "urbanism" here referred to is not that of Wirth (1938); it is something other than the concepts of population size, density, and heterogeneity. An examination of the results of all phases of the analysis tends to show that elements of urban life, such as a greater incidence of incomplete family structure (one might say a weakened or disrupted family structure), more apartment renters, more working women, and possibly greater population size, density, and mobility, provided some of the "contributing conditions" referred to earlier in this chapter.

The "economic pressures", which are inextricably linked with the above mentioned urban elements, are indexed by such attributes as poverty (as measured by a relatively high infant mortality rate), unemployment, and low socio-economic status generally. The predictive emphasis shifts within this blend of factors depending upon the type of criminal offence one wishes

to "explain".

One more point must be made with respect to predicting or explaining crime rate variations. Given what we know about the production of official crime rates, it is perhaps not surprising that in virtually every study which has considered its impact, including the present analysis, the population-police ratio is so strongly associated with their distribution. If crime rates are thought of as "production figures", the productivity of police agencies, a higher ratio of police personnel in a city would contribute substantially to an explanation of that city's higher crime rates. Indeed, municipalities in B.C. with consistently high rates of crime in most categories -- Vancouver, Victoria, New Westminster, Williams Lake, and Quesnel, for example -- have comparatively high ratios of police to population; communities with comparatively low ratios of police to population, such as Summerland, Chilliwhack(D.M.), Salmon Arm, North Vancouver, and Comox, have relatively lower crime rates. The analysis in this thesis was cross-sectional and cannot begin to sort out the temporal relationship between the number of police and crime rates. Do increases in the number of police actually produce increases in crime, or do increases in crime produce conditions where police departments can expand?

The present study is admittedly incomplete. The unavailability of certain types of data insured that this would be the case. The publication of the 1981 Census of Canada will

soon provide more up-to-date information at the municipal level which will afford researchers a better opportunity to map and analyze the ecological patterns of crime. More accurate crime data may become available through the use of techniques such as victimization surveys, perhaps used in conjunction with police statistics.

Future research in the ecology of crime might do well to explore the possible connection between the functional specialization of cities and the differential distribution of crime. The present study was unable to measure a number of possible contributors to an explanation of crime rate variation, one of which was the type of business or industrial activity which characterizes a community. Better measures, also, of income distribution, ethnic composition, age structure, and information concerning targets at risk which would assist in the calculation of more valid crime rates, might yield a clearer picture of inter-urban crime in British Columbia. While the ecological approach may not be able to determine the "causes" of crime, it can, however, provide us with a better understanding of the patterns of crime in particular geographic and social settings.

APPENDIX

A. Crime Rates* for 56 B.C. Municipalities, 5,000 Population and Over.

Municipalities	1976 Census Population	a	b	c	d	e	f	g	h	i	j
Vancouver	410,188	.73	8.27	2.29	5.65	3.65	22.42	6.39	14.65	9.69	8.33
Burnaby	131,599	.54	5.36	.83	4.31	.85	15.80	5.46	8.95	7.47	6.84
Surrey	116,497	.37	6.73	.55	6.07	.76	24.39	6.85	15.19	5.82	8.45
Richmond	80,034	.31	6.31	.86	5.30	.34	15.58	4.34	8.76	6.62	3.80
Saanich	73,383	.35	2.72	.40	2.16	.50	10.09	3.04	5.86	2.98	2.54
Delta	64,492	.22	4.84	.47	4.04	.22	9.47	1.98	6.12	3.68	2.14
North Van.(D.M.)[1]	63,471	.28	3.21	.52	2.53	.24	12.19	2.44	8.96	4.45	3.77
Victoria	62,551	.52	8.27	1.25	6.82	1.64	24.13	10.76	10.50	6.93	8.39
Prince George	59,929	.43	8.68	2.04	6.18	.63	16.01	5.72	8.52	7.96	8.05
Kamloops	58,311	.43	7.58	1.45	5.89	.68	18.17	6.67	9.64	8.32	5.24
Coquitlam	55,464	.17	5.07	.50	4.35	.60	12.37	2.12	8.68	3.07	3.36
Kelowna	51,955	.22	4.13	.78	3.07	.23	18.07	7.08	9.28	5.69	4.56
Nanaimo	40,336	.53	6.51	1.07	5.01	.67	25.88	10.40	12.49	5.59	7.11
New Westminster	38,393	.58	10.95	1.09	9.39	2.15	24.15	8.14	14.35	11.20	12.00
West Vancouver	37,144	.27	2.12	.14	1.91	.26	9.47	1.36	6.93	5.03	2.52
Langley (D.M.)[1]	36,659	.14	3.73	.62	3.03	.23	11.58	2.47	6.68	2.91	2.03
North Vancouver	31,934	.49	6.78	1.30	4.51	.66	18.92	6.63	10.77	5.89	7.52
Matsqui	31,178	.22	3.55	.22	2.63	.14	7.09	3.47	3.46	2.99	2.10
Maple Ridge	29,462	.44	8.01	1.00	6.73	.43	19.04	5.52	11.78	5.16	3.44
Chilliwhack(D.M.)[1]	28,421	.21	4.12	.60	3.31	.20	9.51	3.18	4.90	3.05	2.47
Port Coquitlam	23,926	.31	6.00	.60	5.06	.35	14.06	2.93	9.17	3.78	4.28
Penticton	21,344	.44	8.64	1.11	7.22	.41	15.99	6.17	5.98	5.65	5.03
Port Alberni	19,585	.41	8.73	.53	7.66	.34	13.11	4.87	6.71	5.21	3.17
Oak Bay	17,658	.09	0.68	.21	.45	.06	6.30	1.21	4.61	2.62	0.77
Vernon	17,546	.32	9.71	1.46	7.77	.85	25.11	10.60	11.89	6.36	5.45
North Cowichan	15,956	.33	6.08	.94	4.68	.13	10.45	2.78	5.74	4.51	2.36
Esquimalt	15,053	.42	3.90	.78	2.83	.31	18.34	6.27	11.23	5.87	3.12
Mission	14,997	.24	6.71	.84	5.71	.22	11.62	3.07	5.33	4.25	2.89
Prince Rupert	14,754	.32	12.18	3.55	8.40	.34	22.41	8.16	11.00	6.69	3.59
Powell River	13,694	.37	7.79	.61	6.38	.19	15.02	5.21	6.50	4.89	4.99
Cranbrook	13,510	.30	13.32	2.37	10.66	.49	17.30	9.43	5.43	6.17	2.96
White Rock	12,497	.21	5.92	1.00	4.67	.45	13.02	4.72	7.52	4.24	4.64
Campbell River	12,072	.47	11.90	1.74	9.94	.66	28.83	11.54	13.01	8.95	7.62
Kitimat	11,956	.31	7.95	.72	7.14	.14	8.11	3.21	2.82	3.29	2.01
Port Moody	11,649	.43	8.38	1.29	6.50	.57	12.82	4.69	7.18	7.30	5.18
Dawson Creek	10,528	.16	11.33	1.23	9.66	.73	24.82	16.37	5.60	8.11	8.23
Terrace	10,251	.65	12.62	1.37	11.09	.07	24.55	9.98	11.48	7.09	5.17
Langley	10,123	.33	8.59	1.65	6.62	.36	26.51	14.88	8.92	7.28	7.31

A. Crime Rates* for 56 B.C. Municipalities, 5,000 Population and Over.(continued)

Municipalities	1976 Census Population	a	b	c	d	e	f	g	h	i	j
Trail	9,976	.20	3.71	.40	3.11	.13	8.55	3.71	4.20	1.54	3.14
Abbotsford	9,507	.35	6.70	1.51	4.87	.42	12.83	5.08	7.01	5.57	2.88
Salmon Arm	9,391	.25	5.68	2.17	3.34	.18	18.67	8.02	7.45	3.80	2.88
Nelson	9,235	.25	5.85	.58	4.55	.22	9.89	3.65	3.93	6.89	3.43
Fort St.John	8,947	.48	11.51	2.35	8.79	.60	16.73	9.17	6.48	7.19	10.02
Chilliwack	8,634	.62	10.73	1.43	8.64	1.47	24.09	10.82	10.23	5.10	5.10
Squamish	8,368	.24	10.95	1.71	8.64	.08	17.05	7.69	7.33	5.90	4.14
Courtenay	7,733	.47	9.27	1.16	7.33	.39	20.56	8.75	8.75	4.48	5.91
Quesnel	7,637	.31	13.84	2.75	10.48	.39	26.49	12.18	10.34	7.16	9.47
Central Saanich	7,413	.22	2.16	.22	1.93	.18	8.05	2.65	2.92	3.60	1.26
Kimberly	7,111	.23	6.80	.89	5.39	.05	6.09	2.58	2.39	1.97	0.98
Sidney[2]	6,732	.30	5.64	1.49	3.57	.15	5.94	2.53	2.38	4.16	1.63
Summerland	6,724	.05	2.78	.64	1.78	.09	7.63	3.27	3.02	2.28	0.94
Castlegar[2]	6,255	.32	7.03	1.60	4.48	.32	7.99	2.40	3.68	3.36	1.28
Williams Lake[2]	6,199	.32	16.62	3.23	12.91	.32	16.78	8.39	5.00	9.84	14.20
Merritt	5,680	.23	17.37	2.23	14.85	.94	16.61	8.16	6.92	4.17	4.11
Comox[2]	5,359	.37	1.12	.19	.37	.00	9.33	2.80	5.22	1.68	2.05
MacKenzie[2]	5,338	.00	3.37	.56	2.62	.19	4.31	1.69	2.25	5.99	2.25

*The rates are based on the average number of crimes over 3 years (1975,1976,1977) per 1,000 population.

[1]District Municipality: For example, Nth. Vancouver District, as opposed to Nth. Vancouver City.

[2]Rates are based on 1977 figures only.

a. SEXCRIME b. ASSAULTS c. AGGRASS d. COMMON e. ROBBERY
f. BETHEFT g. BUSINESS h. RESIDENT i. OVER j. VEHICLES

B. Complete List of Variables with Their Definitions

Variable Name	Definition
(Crime)	(Rates based on 1,000 population)
SEXCRIME	Rape and Indecent Assault, Female
ASSAULTS	Total Assaults
COMMON	Common Assault
AGGRASS	Assault Causing Bodily Harm and Wounding
ROBBERY	Total Robbery
BETHEFT	Total Breaking & Entering and Theft
BUSINESS	Breaking & Entering and Theft from Businesses
RESIDENT	Breaking & Entering and Theft from Residences
OVER	Total Theft over $200
VEHICLES	Total Motor Vehicle Theft
(Socio-Demographic)*	
APARTMNT	% occ. private dwell. which are apartments.
ATSCHOOL	% population attending school full-time.
AVEKFAM	Average number of children per family.
AVEPERHH	Average number of persons per household.
AVEPFAM	Average number of persons per family.
BIRTHS	Birth Rate per 1,000 population.
CHANGE	% population change from 1971 to 1976.
DEADBABY	Infant mortality rate per 1,000 population.
DEATHS	Mortality rate per 1,000 population.
DEGREES	% population (not attending school full-time) with university degrees.
DENSITY	Population density per square mile.
DIVORCED	% population divorced.
DFEMHEAD	% female heads of households divorced.
DMENHEAD	% male heads of households divorced.
FAMILY	% population in families.

B. Complete List of Variables with Their Definitions (continued)

Variable Name	Definition
FAMILYNH	% families not maintaining own household.
FAMILY5K	% families with 5 or more children.
FAMKID18	% families with children at home 18 and over.
FEMALES	% population which is female.
FEMDEG	% females (not attending school full-time) with university degrees.
FEMHEADS	% household heads female.
FEMLABOR	% females in the labour force.
FEMRATE	Part. rate** for females in labour force.***
FROMOUT	% migrants from outside Canada.
FROMPROV	% migrants from other provinces.
HOUSESA	% occ. private dwell. single attached.
HOUSESD	% occ. private dwell. single detached.
KIDSO25	% children in families 25 and over.
KIDSU15	% children in families under 15.
KIDS1524	% children in families 15-24.
LABFOR9	% labour force with less than grade 9 educ.
LABFORM9	% males in the labour force with less than grade 9 educ.
LABORFEM	% labour force which is female.
LFMARFEM	% married females (15-over) in labour force.
LONEPARF	% single-parent families with female parent.
LONEPARM	% single-parent families with male parent.
LONEPARP	% family persons in single-parent families.
LPFAMILY	% families which have single parent.
L9RATE	Part. rate for labour force with less than grade 9 educ.
MALE1524	% population which is male 15-24.
MARFEMLF	% labour force which is married females.

B. Complete List of Variables with Their Definitions (continued)

Variable Name	Definition
MARRIED	% population married.
MENRATE	Part. rate** for males in labour force.***
MFEMRATE	Part. rate for married females in labour force.
MIGRANTS	% population who are migrants since 1971.
MINORITY	% population, mother tongue is not English.
ML9RATE	Part. rate for males with less than grade 9 educ.
MOVERS	% population which moved between 1971-76.
MWOMRATE	Part. rate for married females 24-35.
MYFRATE	Part. rate for married females 15-24.
NOFAMILY	% population, non-family persons in private households.
NOWORK	% labour force unemployed.
NPOSTSEC	% population (not attending school full-time) without post-secondary educ.
OVER54	% population 55 and over.
OWNED	% private dwellings owner occupied.
POPLESS9	% population (not attending school full-time) with less than grade 9 educ.
POP5	% population 5 and over.
POP15	% population 15 and over.
POP1976	Population, 1976.
PPR	Population to Police Ratio.
PRIVHH5	% households with more than 5 persons.
RENTED	% occupied private dwellings rented.
SCHMALES	% males attending school full-time.
SFEMHEAD	% female household heads, never married.
SINGLE15	% population 15 and over, never married.
SMENHEAD	% male household heads, never married.
UNEFRATE	% female labour force unemployed.
UNEMRATE	% male labour force unemployed.
WDLFFEM	% females in labour force widowed/divorced.
WFEMHEAD	% female household heads widowed.
WOMENLP	% female single parents 25-34.

B. Complete List of Variables with Their Definitions (continued)

Variable Name	Definition
YFEMHEAD	% female household heads 15-24
YFEMLPAR	% female single-parents 15-24.
YMENHSCH	% male children living at home and at school full-time 15-24.
YOUNGMEN	% males 15-24.

*The Socio-Demographic variables are arranged alphabetically.

**Participation Rate: The percentage that the total labour force forms of the population 15 years of age and over.

***Labour Force: The non-inmate (of mental hospitals, homes for the aged, penitentiaries, etc.) population 15 years and over, employed and unemployed.

C. Means and Standard Deviations of all Variables, for 56 B.C. Municipalities.

Variable	Mean	Standard Deviation
SEXCRIME	0.3354	0.1459
ASSAULTS	7.2944	3.6810
AGGRASS	1.1620	0.7659
COMMON	5.7814	3.0531
ROBBERY	0.4976	0.5827
BETHEFT	15.5410	6.5063
BUSINESS	5.9598	3.5219
RESIDENT	7.6098	3.3021
OVER	5.3822	2.1474
VEHICLES	4.6268	2.8964
PPR	755.1607	160.3404
POP1976	34013.1964	58122.3401
DENSITY	2088.7247	2228.5887
AVEPERHH	2.9857	0.3590
AVEPFAM	3.3054	0.2659
AVEKFAM	1.3946	0.2504
MENRATE	75.1446	6.5616
UNEMRATE	7.5268	2.0043
FEMRATE	43.9036	5.0050
UNEFRATE	10.9107	2.8275
MFEMRATE	42.7696	5.1633
L9RATE	39.2536	9.8085
ML9RATE	55.1714	12.6650
MYFRATE	55.4946	8.4761
MWOMRATE	47.8071	5.7858
CHANGE	119.3047	26.3146
YOUNGMEN	19.1152	2.1875
MALE1524	9.5343	1.1933
OVER54	18.3669	8.8451
SINGLE15	24.0727	2.8092
MARRIED	50.2611	2.5108
DIVORCED	1.8827	0.7255
MINORITY	12.8098	4.8172
OWNED	68.6793	11.6063
RENTED	31.3171	11.6153
HOUSESD	66.8016	13.6227
HOUSESA	6.9294	3.8414
APARTMNT	19.3464	13.8145
PRIVHH5	6.7302	2.2112

C. Means and Standard Deviations of all Variables, for 56 B.C. Municipalities.(continued)

Variable	Mean	Standard Deviation
NOFAMILY	11.8032	4.6653
FAMILY	85.4251	5.3366
LPFAMILY	9.3614	2.3518
FAMILY5K	2.1127	0.8176
KIDS1524	29.9890	5.3996
KIDSO25	2.5817	1.4164
MOVERS	55.4432	7.7071
MIGRANTS	34.6674	9.2141
FROMOUT	11.3832	6.1225
FROMPROV	25.9925	8.7009
ATSCHOOL	6.5655	1.3622
SCHMALES	6.9349	1.5702
POPLESS9	18.1469	5.5225
NPOSTSEC	66.9567	6.5861
DEGREES	5.9766	2.9424
FEMDEG	3.9107	1.8515
LABORFEM	37.2407	3.3767
FEMLABOR	32.8829	3.9733
MARFEMLF	24.2340	1.7603
LFMARFEM	42.7722	5.1541
FEMHEADS	19.0298	6.8755
YFEMHEAD	12.8137	5.6059
DMENHEAD	2.2685	2.5958
SMENHEAD	7.9752	7.6709
DFEMHEAD	16.4769	14.9098
WFEMHEAD	49.5372	60.1906
YMENHSCH	14.1717	4.0664
LONEPARM	17.0633	5.5024
LONEPARF	83.0045	5.7617
YFEMLPAR	9.3530	4.8023
WOMENLP	25.9883	5.7318
LONEPARP	8.0945	2.2060
FAMILYNH	1.7011	0.5615
FAMKID18	13.3508	5.5051
WDLFFEM	8.3498	2.6917
LABFOR9	10.9277	3.6753
LABFORM9	12.6937	4.2992

C. Means and Standard Deviations of all Variables, for 56 B.C. Municipalities.(continued)

Variable	Mean	Standard Deviation
BIRTHS	33.3927	131.6427
DEATHS	7.4846	3.0984
DEADBABY	0.2170	0.1533
FEMALES	50.1580	1.7503
POP5	92.5235	2.1019
POP15	74.7475	5.5028
SFEMHEAD	22.0836	16.0253
NOWORK	8.7495	1.9010
KIDSU15	67.4293	6.5279

D. Table of Zero-Order Correlations

	a	b	c	d	e	f	g	h	i	j
PPR	-.557**	-.457**	-.388*	-.446**	-.536**	-.408*	-.354*	-.398*	-.648**	-.514**
POP1976	.409*	-.087	.051	-.105	.743**	.178	-.043	.435**	.304	.236
DENSITY	.491**	.045	.056	.036	.669**	.270	.184	.374*	.299	.328
AVEPERHH	-.322	.145	.084	.156	-.475**	-.244	-.183	-.306	-.149	-.174
AVEPFAM	-.235	.258	.175	.262	-.382*	-.157	-.057	-.272	-.037	-.085
AVEKFAM	-.156	.316	.241	.314	-.305	-.070	.010	-.182	.044	-.008
MENRATE	-.019	.232**	.169**	.243**	-.215	-.031**	-.029**	-.039	.181**	.082**
UNEMRATE	.189	.549**	.530**	.509**	.304	.499**	.568**	.268	.489**	.538**
FEMRATE	.272	.222	.329	.198	.174	.255	.206	.271	.510**	.362*
UNEFRATE	-.046	.258	.207	.237	-.080	.175	.225	.040	.065**	.051*
MFEMRATE	.204	.233	.323	.212	.158	.262	.241	.247	.481**	.368*
L9RATE	-.109	.299	.307	.289	-.179	-.050	.009	-.121	.211	.095
ML9RATE	-.097	.309	.252	.314	-.202*	-.061	-.015	-.118	.175	.072
MYFRATE	.282	-.203	-.069	-.209	.403*	.131	.008	.341	.172	.137
MWOMRATE	.263*	-.213	-.066	-.221	.416*	.121	.039	.264	.299	.228
CHANGE	-.369*	-.158	-.034	-.172	-.275	-.135	-.050	-.209	-.008	-.084
YOUNGMEN	.246	.226	.173	.222	.120	.235	.265	.190	.277	.295
MALE1524	.160	.265	.206	.259	.011	.156	.199	.105	.241	.226
OVER54	.032**	-.322	-.242	-.323	.248**	-.022	-.040	.042*	-.183**	-.112*
SINGLE15	.475*	.293**	.293**	.281**	.501*	.324*	.234*	.383	.467**	.400**
MARRIED	-.369**	-.580**	-.488**	-.569**	-.362**	-.417**	-.424*	-.303**	-.579**	-.494**
DIVORCED	.579**	.036	.047	.033	.659**	.452**	.286	.588**	.435**	.417*
MINORITY	.149**	.189*	.107*	.194*	.310**	.028**	.005**	.063**	.079**	.026**
OWNED	-.569**	-.364*	-.370*	-.345*	-.608**	-.583**	-.526**	-.554**	-.635**	-.611**
RENTED	.570**	.365	.370*	.346	.608**	.583**	.525*	.554**	.636**	.611**
HOUSESD	-.468**	-.314	-.347*	-.295	-.524**	-.444	-.378	-.462**	-.600**	-.517**
HOUSESA	.129**	.322	.231	.322	-.142**	.187*	.291	.018**	.178**	.151**
APARTMNT	.491**	.119	.148	.113	.608**	.393*	.279	.496**	.490**	.457**
PRIVHH5	-.181**	.340	.276	.340	-.283**	-.085*	.008	-.223**	.036**	-.011**
NOFAMILY	.458**	.126	.177	.110	.666**	.406*	.335*	.432**	.433*	.432*
FAMILY	-.448**	-.121*	-.153	-.111*	-.675**	-.416**	-.343**	-.448**	-.400**	-.414**
LPFAMILY	.584**	.416*	.323	.404*	.532**	.655**	.609**	.575**	.583**	.555**
FAMILY5K	-.052	.314*	.294*	.300*	-.143	.021	.191	-.184	.111	.078
KIDS1524	.143	-.397*	-.346*	-.384*	.229**	-.093	-.209	.106	-.224	-.144
KIDSO25	.261	-.244	-.165	-.246	.540**	.046	-.053*	.215	.050	.063
MOVERS	.016	.226	.313	.194	-.034	.269	.347*	.098	.322	.287
MIGRANTS	-.255*	-.049	.051	-.071	-.201**	-.032	.054	-.135*	.048	.026
FROMOUT	.409*	.013	.070	.011	.528**	.133	-.075	.360*	.229	.166
FROMPROV	-.106	0.318	-.177	-.327	-.097	-.146	-.038	-.194	-.198	-.126

D. Table of Zero-Order Correlations (continued)

	a	b	c	d	e	f	g	h	i	j
ATSCHOOL	.002	-.385*	-.336*	-.382*	.022	-.260	-.317	-.100	-.192	-.197
SCHMALES	.055	-.438**	-.401*	-.425*	.057	-.228	.293*	-.057	-.222	-.204
POPLESS9	.141	.387*	.287	.374*	.246	.294	.407*	.075	.059	.123
NPOSTSEC	.092	.477**	.314	.472**	.047	.334	.444**	.085	.086	.198
DEGREES	-.096	-.361*	-.200	-.360*	.053	-.257	-.336	-.062	-.066	-.142
FEMDEG	-.023	-.302	-.092	-.314	.154**	-.196	-.294	.008*	.014	.077
LABORFEM	.334**	-.115	.031	-.137	.471**	.309	.241	.359**	.300**	.300*
FEMLABOR	.430**	.001	.153	-.022	.455**	.305	.180	.431**	.470**	.363*
MARFEMLF	-.244	-.078	.056	-.098	-.255	-.007	.062	-.089	.002**	.005**
LFMARFEM	.205**	.229	.320	.209	.159**	.262*	.240*	.247*	.480**	.366**
FEMHEADS	.438**	.046**	.068**	.035**	.577**	.396*	.351*	.398*	.317**	.351*
YFEMHEAD	.203	.504**	.466**	.488**	.101	.348*	.410*	.191	.515**	.426*
DMENHEAD	.168	.047	-.065	.053	.100	.101	.039	.101	.091	.127
SMENHEAD	.230	.176	.072	.174	.186	.181	.146	.141	.228	.246
DFEMHEAD	.054	-.002	-.139	.015	-.073	-.010	-.060	-.002	.007	.027
WFEMHEAD	-.005	-.039**	-.148*	-.031**	-.087	-.048	-.057	-.083	-.116	-.050
YMENHSCH	-.035	-.505**	-.421*	-.495**	.034	-.252	-.323	-.068	-.328	-.255
LONEPARM	-.287	-.072	-.035	-.069	-.215	-.286	-.292	-.246	-.110	-.238
LONEPARF	.245	.038**	.077**	.015**	.194	.234*	.263**	.182	.119	.241
YFEMLPAR	.077	.514**	.465**	.488**	.059	.362*	.450**	.145	.330	.274
WOMENLP	.179	.311**	.164	.324*	-.084**	.304**	.302**	.217**	.219**	.323**
LONEPARP	.577**	.376**	.284	.369*	.557**	.651**	.613**	.567**	.564*	.555**
FAMILYNH	.181	.309	.338	.306	.444**	.202	.089	.246	.348*	.272
FAMKID18	.191*	-.338	-.255	-.334	.394*	-.015	-.136	.180	-.077	-.050
WDLFFEM	.387*	-.102**	-.102*	-.103**	.417*	.194	.101*	.296	.103	.120
LABFOR9	.035	.503**	.421*	.485**	.084	.213	.353*	-.030	.095	.116
LABFORM9	.050	.523**	.419*	.511**	.092	.249	.389*	-.004	.129	.139
BIRTHS	.012	.002	.084	-.017	-.025	-.048	-.021	-.025	.030	-.066
DEATHS	.141	-.118**	-.072**	-.122**	.331	.173*	.136*	.204	-.009*	.041*
DEADBABY	.259	.651**	.480**	.659**	-.013	.405*	.427*	.221	.342*	.354*
FEMALES	.189	-.221*	-.167	-.216*	.330	.176	.137	.209	.031	.137
POP5	.155	-.362*	-.294	-.360*	.331	-.025	-.119	.139	-.154	-.088
POP15	.226	-.301	-.215	-.302	.412	.078	-.021	.229	-.025	.029
SFEMHEAD	.141	.141**	.071**	.135**	.116	.109**	.095**	.059	.201*	.214*
NOWORK	.117	.505**	.479**	.463**	.168	.452**	.520**	.225	.369*	.399*
KIDSU15	-.177	.381*	.322	.371*	-.307	.067	.185	-.135	.174	.105

*Significant at the .01 level.
**Significant at the .001 level.

E. Variable Set for Factor Analysis.

MIGRANTS	DENSITY	AVEPERHH	AVEPFAM
UNEMRATE	FEMRATE	MFEMRATE	MYFRATE
MWOMRATE	CHANGE	SINGLE15	DIVORCED
OWNED	HOUSESD	APARTMNT	NOFAMILY
LPFAMILY	KIDSO25	MOVERS	SCHMALES
POPLESS9	NPOSTSEC	LABORFEM	LFMARFEM
FEMHEADS	YFEMHEAD	YMENHSCH	YFEMLPAR
LONEPARP	MARRIED	KIDS1524	WDLFFEM
LABFOR9	NOWORK	KIDSU15	FEMALES
OVER54	MALE1524		

F. Variable Set for Multiple Regression Analysis.

PPR	POP1976	DENSITY	AVEPERHH
AVEPFAM	UNEMRATE	FEMRATE	CHANGE
SINGLE15	DIVORCED	OWNED	HOUSESD
APARTMNT	FAMILY	LPFAMILY	MOVERS
FROMOUT	FROMPROV	ATSCHOOL	SCHMALES
POPLESS9	NPOSTSEC	LABORFEM	MARFEMLF
FEMDEG	FEMHEADS	YMENHSCH	LONEPARP
FAMILYNH	FAMKID18	WDLFFEM	LABFORM9
NOWORK	MALE1524	OVER54	MINORITY
PRIVHH5	FEMALES	FAMILY5K	ML9RATE
LONEPARF	MFEMRATE		

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